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BY

DR. H. KNAPP
OF NEW YORK

AND

DR. C. HESS
OF WÜRZBURG

DR. W. A. HOLDEN
OF NEW YORK
ASSISTANT EDITOR

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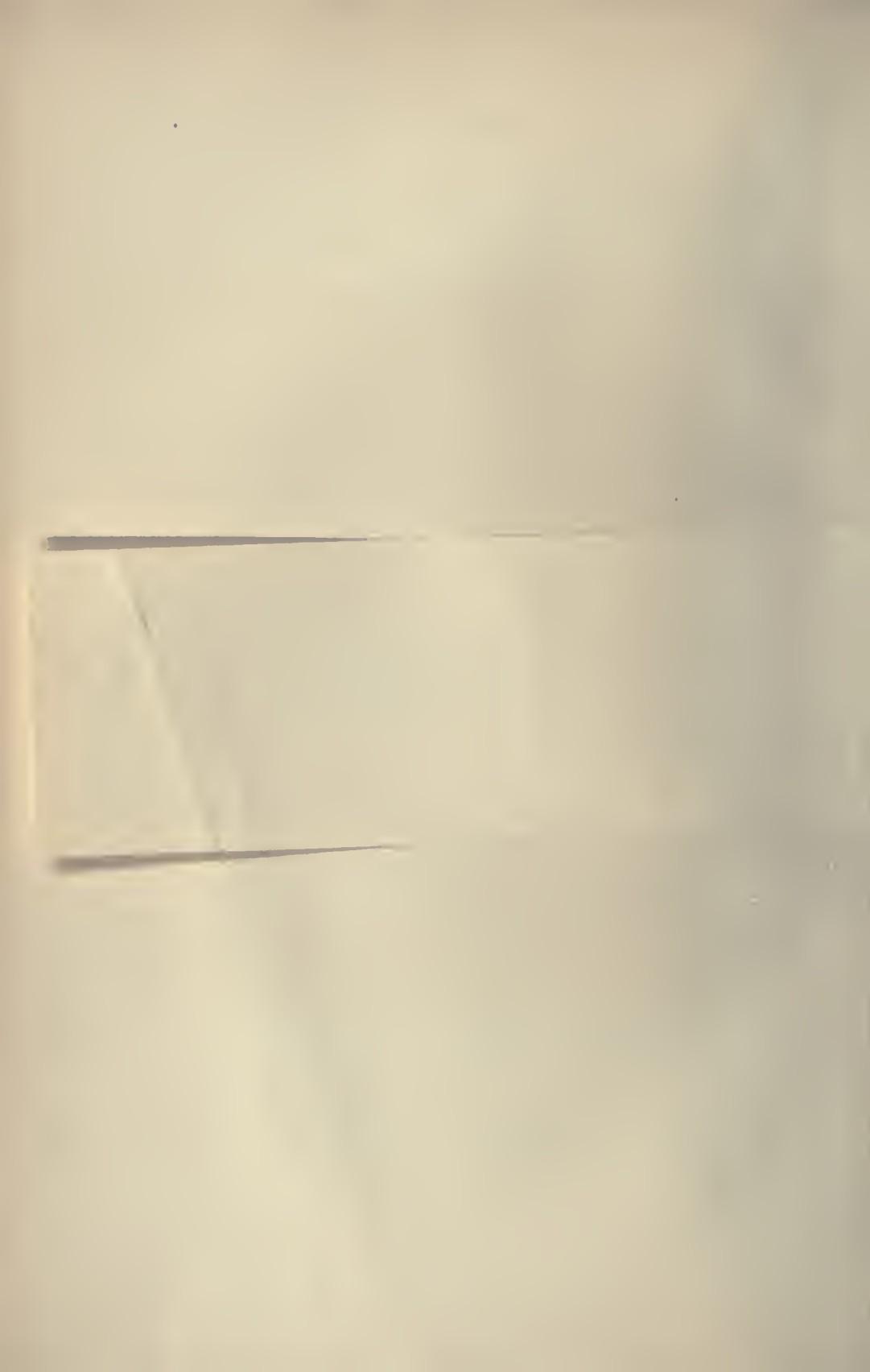
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Türker, Chinin Amaurosis mit Bericht über einen Fall.





Dürker, Chinin-Amaurosis mit Bericht über einen Fall.



Hürker, Chinin-Anaurosis mit Bericht über einen Fall.

ARCHIVES OF OPHTHALMOLOGY.

OBSTRUCTION OF THE CENTRAL
RETINAL VEIN.*

By F. H. VERHOEFF, A.M., M.D.,

PATHOLOGIST AND ASSISTANT OPHTHALMIC SURGEON, MASSACHUSETTS CHARITABLE
EYE AND EAR INFIRMARY, BOSTON.

(With thirteen figures on Text-Plates I.-III.)

THE ophthalmoscopic picture of thrombosis of the central retinal vein has generally been regarded as definite and characteristic. Yet in a large proportion of the cases anatomically examined in which this diagnosis has been made, the central vein has been found patent and comparatively normal. In fact, previous to the recent publication of Harms, obstruction of the vein had been conclusively demonstrated in no more than six cases, in each of which it was attributed to thrombosis. In the eight cases of Harms, the obstruction was described as due wholly or in part to thrombosis in six. This would seem to indicate that the most common cause of obstruction of the central vein was thrombosis. A more critical analysis of the literature, however, does not substantiate this view, but goes to show that except in two special cases of thrombosis, due to sepsis, proof is lacking that this process occurred in any of the cases.

The six cases here to be described, in each of which the obstruction was due entirely to proliferative endophlebitis, seem to throw additional light on previous cases, and to indicate that in most, if not all, of them the

* Read in abstract at Toronto by invitation of the Ophthalmic Section of the British Medical Association, August, 1906.

obstruction was of a like nature. The first case occurred in the private practice of Dr. Allen Greenwood, of Boston, to whose courtesy I am indebted for the enucleated eye and also for the clinical data. For the privilege of reporting the clinical features of the second case I am indebted to Dr. F. E. Cheney, on whose service at the Infirmary it occurred.

CASE I.—*Hemorrhagic retinitis with classical ophthalmoscopic picture of thrombosis of central retinal vein. Acute glaucoma. Iridectomy. Enucleation six days after onset of glaucoma and twenty-six days after onset of dimness of vision. Anatomical findings: Complete obstruction of central retinal vein behind lamina cribrosa, due to endophlebitis proliferans. Hemorrhagic retinitis with marked retinal œdema. No atrophy of optic nerve or retina, no cupping of optic disk.*

Mrs. R. E. D., aged sixty-three, was first seen by Dr. Greenwood February 19, 1906. Patient stated that sight of left eye had been blurred for a week. No pain at any time. Examination: left eye, light perception only, pupil normal, tension normal. Fundus shows hemorrhages everywhere, veins much dilated, dark and tortuous, arteries small, outline of disk obscured. Retina very hazy. Diagnosis: thrombosis central retinal vein. Right eye, vision normal, fundus normal, with the exception of a questionable thickening of the walls of some of the retinal vessels. General health good. Physical examination negative, heart normal and no evidences of general arterio-sclerosis. Urine examination negative for albumin and sugar. Thirteen days later the left eye became very painful, and an unbearable neuralgia involved the left side of head. When seen on the following day the left eye was found congested and stony-hard, the pupil dilated and showing a grayish-green reflex, the cornea steamy, and the anterior chamber almost obliterated. No perception of light. Under ether, iridectomy was attempted, but only a small section of the iris could be removed. This only partly relieved the pain and slightly reduced the tension. Owing to the severe pain, enucleation was performed March 10, 1906, twenty-six days after the onset of dimness of vision and six days after the onset of glaucoma.



FIG. 1.

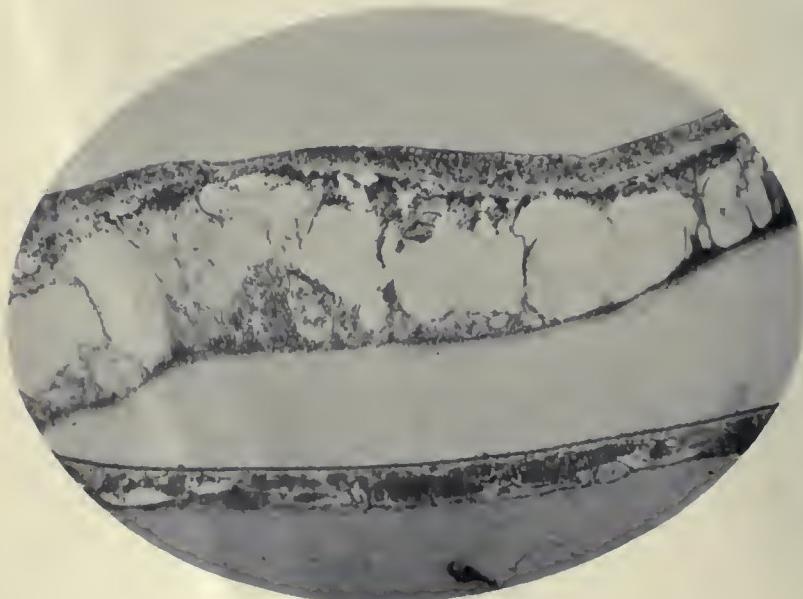


FIG. 2.

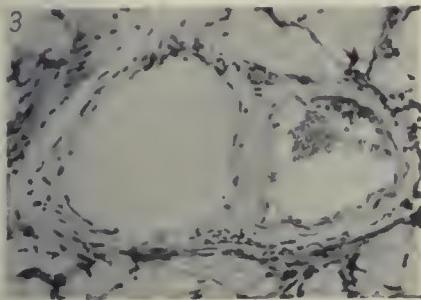


FIG. 3.

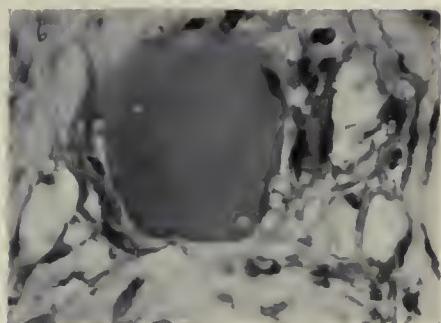


FIG. 6.

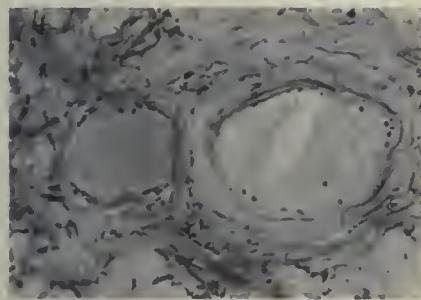


FIG. 4.

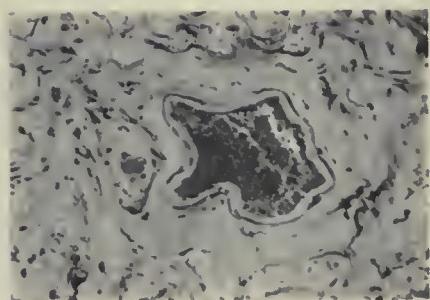


FIG. 7.

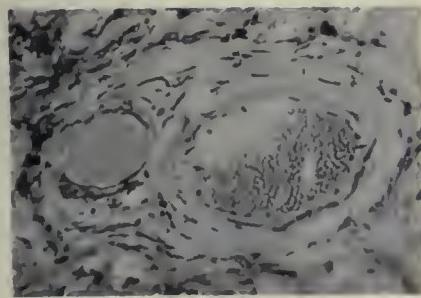


FIG. 5.



FIG. 8.



FIG. 9.

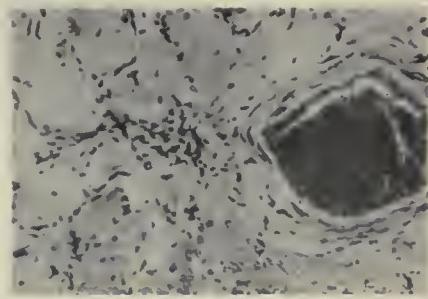


FIG. 11.

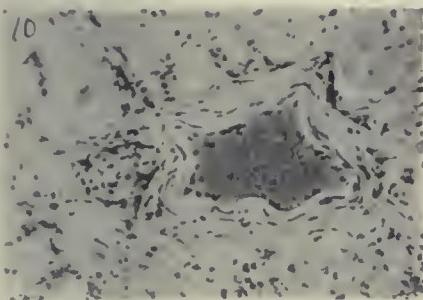


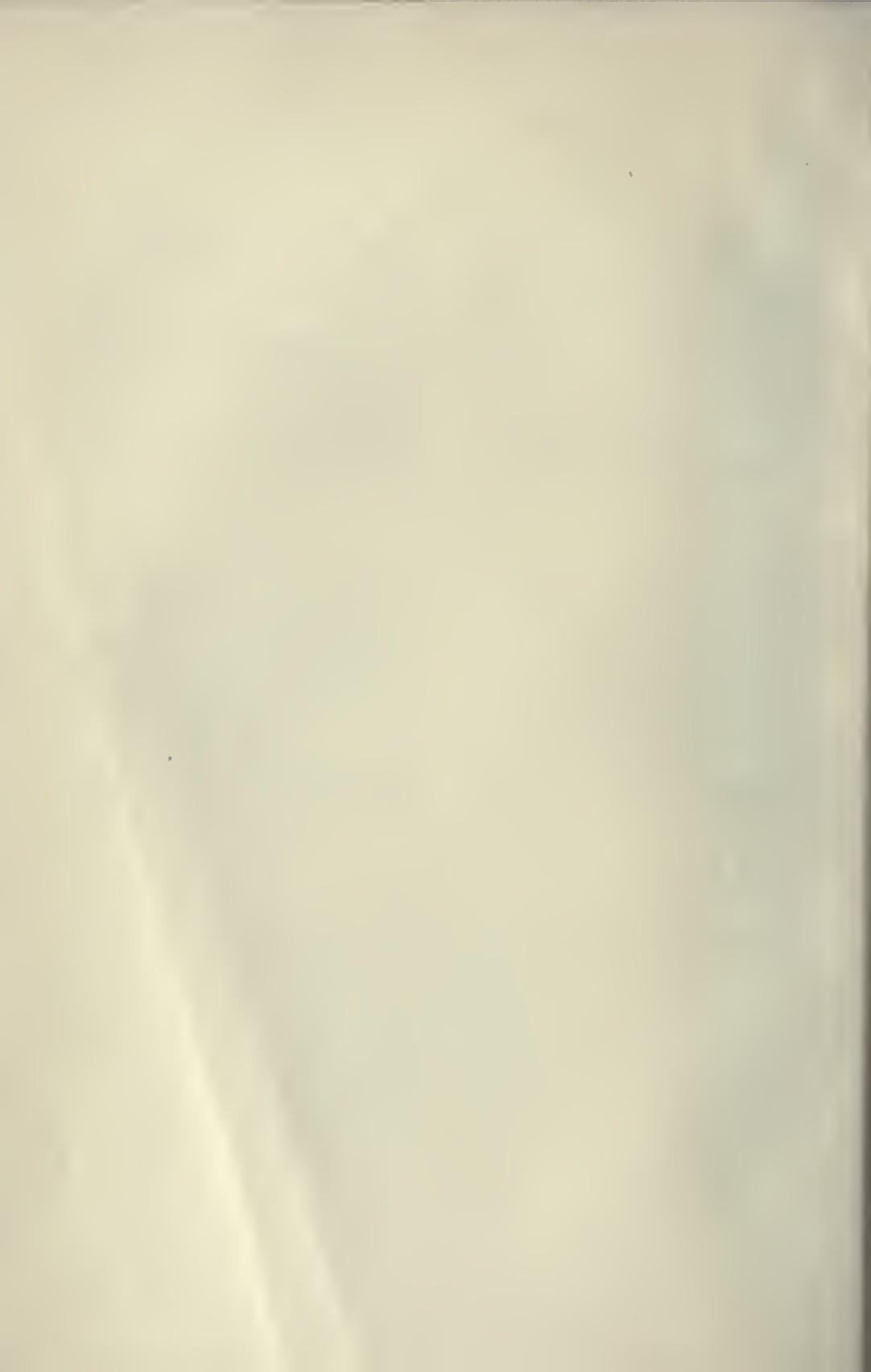
FIG. 10.



FIG. 12.



FIG. 13.



PATHOLOGICAL EXAMINATION.

After hardening several days in formalin, the globe was sectioned horizontally above the optic disk. Diameters of globe: Antero-post., 23.5mm, horizontal, 24mm, vertical, 23.5mm.

The cornea is clear, but is collapsed owing to the opening of the iridectomy wound during the enucleation. Except for the presence of the small coloboma of the iridectomy, the iris appears normal. The anterior chamber is obliterated (due to opening of wound). The lens, 4.25mm and 9.75mm is normal. The vitreous humor is represented by a soft fluffy coagulum, evidently due to presence of albumin, but is free from blood. The choroid is normal. The retina is *in situ*, is swollen, cloudy, and covered with hemorrhages. The latter are most numerous about the disk, where they are usually striate, and become fewer in number and punctate in form towards the periphery. No hemorrhages visible to the naked eye occur nearer than 6mm to the ora serrata. The retinal veins are greatly distended and very tortuous. The macula projects forward as a little mound and shows in its centre a small dark spot .25mm in diameter. The disk is little if at all swollen, but its outline is markedly obscured. The nerve was cut 5mm long.

Histological Examination.—Imbedding in celloidin. The anterior portion of the eye was sectioned horizontally. Longitudinal sections were made of the optic nerve with the retina until the central vessels were nearly reached, when the remaining portion was reimbedded and serial cross-sections made, taking in its entire length and including the disk. The entire series of sections through the part of the vein involved in the endophlebitis were stained, mounted, and examined. Most of the sections were stained in hematoxylin and eosin, others in Van Giesen's stain, and some in Weigert's elastic-tissue stain.

The cornea is normal, shows no oedema or cellular infiltration. The subepithelial tissue at the limbus shows only a slight inflammatory reaction. The ligamentum pectinatum is normal, and the canal of Schlemm is open and contains blood. The root of the iris in some places is in contact with

the ligamentum pectinatum, but there is no fusion of the two structures. The iris stroma is normal, except at one place where it shows an interstitial hemorrhage, evidently due to the trauma of the iridectomy. The ciliary body and its processes are congested but otherwise normal, except that the processes are dragged forward. The pars ciliaris retinæ shows some (senile) hyperplasia posteriorly. The vitreous humor is free from blood corpuscles, but is infiltrated with a faintly granular material staining in eosin, unmistakably coagulated serum. The choroid and pigment epithelium are normal; the latter shows no colloid excrescences. The choroidal vessels are distended, but their walls are normal.

The retina shows only two kinds of histological changes, namely, œdema and hemorrhage, but these are extremely marked. The œdema is most manifest in the layer of Henle, where large cystic spaces are formed. In the macular region these cystic spaces are relatively enormous and practically divide the retina into two layers (Figs. 1 and 2). The spaces are often apparently empty, but not infrequently contain fibrin and a greater or less number of red blood corpuscles. On the nasal side the œdema extends to within 2mm of the ora serrata, while on the temporal side it almost completely disappears within 1cm of the ora serrata. The hemorrhages are widespread, but are not excessively large. They occur up to within a short distance of the ora serrata on each side. Some sections, however, show them absent in the œdematosus retina on the nasal side, although present on the other side, so that the amount of œdema bears no relation to the amount of hemorrhage. The hemorrhages are most numerous in the nerve-fibre layer, but also occur in the internal nuclear layer, from which they sometimes extend into the œdematosus spaces in the layer of Henle. There are no subretinal hemorrhages, and none into the vitreous humor. Subhyaloid hemorrhages are occasionally seen. One such is in the macula, to which is due in great part the dark spot in its centre seen macroscopically. The blood corpuscles are well stained everywhere, and the retina shows no colloid material or hematoidin granules. Sections stained differentially for iron, however, show here and there a cell containing hemosiderin. Some of these cells are met with in the walls of the vessels.

The multipolar ganglion cells are remarkably well preserved both in the macula and elsewhere. Their cytoplasm is sometimes highly vacuolated or the cell bodies swollen and transparent, but the nuclei seldom show any signs of necrosis. The retinal vessels show little departure from the normal. The veins are distended, and some of the vessels possibly show slight thickening of their walls, but the latter are never hyaline, and there is no proliferation of the intima. The retina is nowhere infiltrated with chronic inflammatory cells.

The optic disk presents an almost normal appearance. It is perhaps somewhat oedematous, but so slightly that it does not project above the level of the surrounding retina (Fig. 1). It contains a few small scattered interstitial hemorrhages, most numerous near the surface, but reaching as far back as the lamina cribrosa. The nerve stem shows marked oedema, which, however, does not involve its entire length, but is roughly limited to the portion in which occurs the obstruction in the central vein. Here the spaces along the trabeculae are widely dilated and the nerve bundles also separated by cystic spaces. The oedema is most marked at the periphery of the nerve, and gradually decreases towards the central vessels. The nerve shows no atrophy. There seems to be an increased number of glia cells, but the number is probably within normal limits. No mitotic figures are to be seen among the cells, as might be expected if they were undergoing active proliferation. There are within the nerve a considerable number of corpora amylacea, both large and small.

THE CENTRAL VESSELS.

The central artery, as well as its two main branches, seem comparatively normal. There is undoubtedly some atrophy of the media within and for some distance posterior to the lamina cribrosa, but the intima and internal elastica are perfectly normal. The central vein (Fig. 3) appears essentially normal also until it reaches the posterior part of the lamina cribrosa. The two main branches of the vein in the disk are dilated, and contain a variable number of red blood corpuscles, but no serum. In the central vein itself the red blood corpuscles become fewer, and just before the lamina

cribriforma is reached the lumen becomes filled with serum, which contains only an occasional leucocyte and red blood corpuscle, a condition that persists so long as a lumen is visible.

As the vein is followed backward it decreases somewhat in diameter, and in the posterior part of the lamina cribrosa begins to show proliferation of the intima. The first evidence of the latter process is the appearance of a few fusiform cells immediately beneath the endothelium on the side of the vein away from the artery. Sometimes they seem to have been formed by proliferation of the endothelium, but it is impossible definitely to determine this point, since similar appearances could be produced by proliferation of the subendothelial connective-tissue cells. These cells increase in number, involve a wider extent of the vein wall, and there now appears a layer of fibrous tissue beneath the endothelium to which the cells have evidently given rise (Figs. 4 and 5). Occasionally one of the cells contains two nuclei or shows mitosis. The endothelium remains intact so long as a lumen is recognizable. Coincident with the appearance of the fibrous layer beneath the endothelium, reticular spaces make their appearance between it and the adventitia, which are formed by minute fibrous offshoots from the fibrous membrane (Fig. 6). Each of these spaces is usually occupied by a large cell, whose cytoplasm at first sight appears perfectly transparent, but which on closer examination is found to be finely granular. The nucleus of this cell seems always to be situated at its periphery, and is oval in shape. Occasionally the nucleus is degenerated and shows fragmentation. Within the reticulum may also be seen an occasional space containing red blood corpuscles. Some of the sections show these spaces continuous with small collaterals of the vein. A small amount of colloid material is also sometimes seen, due no doubt to degeneration of the cells.

The whole inner wall of the vein has now become involved, but not evenly so, the changes being most marked on two opposite sides. Still farther back the reticulum becomes coarser in character, the spaces larger but less numerous. The lumen at the same time becomes smaller, as does also the entire cross-section of the vein, owing probably to contraction

of the fibrous tissue. The new tissue is also now more intimately blended with the adventitia so that the line of demarcation between the two is indistinct. A short distance anterior to the point where the lumen disappears, the proliferated intima takes on a still different appearance (Fig. 7). It loses its reticulated structure and becomes fibrillar in character, the fibrillæ having a more or less concentric arrangement with regard to the lumen. There are also fewer cells to be seen. The lining endothelium, as already stated, remains intact to the last, in fact it can be seen in a few sections after the lumen is no longer recognizable (Fig. 8). After the disappearance of the lumen the tissue filling the vein again assumes a coarsely reticulated structure. The appearance presented is now that of a small area of reticulated fibrous tissue surrounded by and blended with an irregular layer of more compact fibrous tissue, the adventitia of the vein (Figs. 9 and 10). Following the vein backward, the thickening of the intima decreases, and a lumen again becomes recognizable but is completely collapsed. Owing to this collapsed condition it is difficult to determine the exact point at which the lumen reappears. In fact it cannot be recognized with certainty until it is possibly of almost normal size (Fig. 11). For this reason also the changes in the vein wall are not easily made out, but they appear to correspond in an inverse order to those described as the obliterated portion was approached. The vein remains collapsed to the end of the nerve, but here and there a few red blood corpuscles can be seen in it. It is noteworthy that the collapse takes place in a direction almost exactly at right angles to that in which it was contracted by the proliferated intima.

Sections of the part of the vein involved in the endophlebitis, stained by Weigert's method, show a complete absence of elastic tissue both within the adventitia and in the proliferated intima. On the other hand, the fibrillæ and reticulum of the latter stain red in Van Giesen's stain, but not intensely so. There is nowhere any cellular infiltration about the vein or within the adventitia. The latter is perforated at intervals by small collaterals, but shows no abnormal vascularization. No pigment of any kind is to be seen in the proliferated tissue of the intima.

By comparing certain "landmarks" in the deepest longitudinal section with corresponding ones in the cross-sections, it is easy to arrive at an accurate estimate of the length of vein involved. The endophlebitis is first plainly recognizable at a point $.5\text{mm}$ behind the choroid, almost on a level with the termination of the subdural space. The total length of vein involved is found to be almost exactly $.65\text{mm}$. The portion completely obliterated began at a point $.8\text{mm}$ behind the choroid and was certainly no more than $.15\text{mm}$ in extent and probably less. This could not be more accurately determined owing to the collapsed condition of the vein behind the obstruction. These measurements closely correspond with those obtained by counting the sections. Measurements of the thickness of the vessel walls, etc., will be found in the descriptions of the illustrations.

REMARKS ON CASE I.

This case seems to be unique, in that the anatomical examination showed that the pathological changes were much more recent than in any other case yet reported. The clinical features of the case accorded with the classical description of thrombosis of the central vein. The sudden onset of dimness of vision without complete loss of sight, the haziness of the retina, the dilatation and tortuosity of the veins, and the retinal hemorrhages clearly pointed to complete venous obstruction. Microscopic examination showed that the central vein was in fact completely occluded, but not by a thrombus. The obstruction was due entirely to obliterative endophlebitis, not even in part to thrombosis. The new-formed tissue in the vein presented the characteristic appearance of proliferated intima, and the serial sections showed the stages in its development probably as clearly as if the vein had been examined at different intervals of time. Aside from this, the transition from the place where the proliferation was first noticeable to the place of complete obliteration was too gradual to admit of the possibility of an organized

thrombus. The histological evidence is still more conclusive when considered in connection with the clinical history. For it is inconceivable that within a space of less than 26 days a thrombus could be organized and completely converted into connective tissue without leaving a trace of its original structure and without producing any reaction within and about the vein wall. It might be urged that it is unsafe to rely upon the clinical history for estimating the duration of the process, if it were not that the microscopic findings confirmed the clinical evidence by showing that the retinal changes were recent. That the obstruction was of recent date was shown also by the collapsed and empty condition of the vein behind it.

The question arises as to the cause of the endophlebitis. There were no manifest signs of general vascular degeneration, and both nephritis and syphilis were apparently excluded. It is well known, however, that sclerosis may exist in the smaller vessels without involvement of the larger vessels of the body, a fact that seems to explain certain obscure conditions of the brain. But in this connection it must be noted that none of the other vessels about the eye, including the posterior ciliary, showed any degenerative changes, and the central vein itself was only locally affected. The important etiological factor was probably the age of the patient (sixty-three years). The situation of the process, just behind the lamina cribrosa, is perhaps accounted for by the fact that here the nerve, and with it the vein, is necessarily subjected to the greatest strain during the movements of the eye. This might act as a stimulus sufficient to cause proliferation of an intima already on the point of senile hyperplasia.

It is interesting that the onset of symptoms was as sudden as would have been expected had the case really been one of thrombosis. It is not impossible, however, that the vision was considerably reduced before the

attention of the patient was attracted to the fact, and that not until the obstruction had become marked enough to cause hemorrhage, perhaps in the macula, was dimness of vision noted. On the other hand, the comparatively normal condition of the multipolar ganglion cells, and the fresh condition of all the hemorrhages, showed that the retinal changes were of recent date. Although the vein was completely closed for only a short distance, no more than .15mm, it is probable that this distance was even less at the onset of symptoms, because it is obvious that the collapse of the lumen might have allowed the tissue on each side of it to have become fused.

The cause of the glaucoma in this case seems sufficiently clear. It was no doubt due to the excess of albumin in the vitreous humor derived from the retinal veins and capillaries. That the vitreous humor was loaded with albumin was shown by the fact that it was found coagulated (by the action of the formalin) when the eye was opened. The excess of albumin would cause increase of tension probably, not on account of its slow filtration into the canal of Schlemm, as has been supposed, but on account of the high osmotic pressure it would set up. This would tend to force the iris forward, occlude the filtration angle, and thus render the condition permanent.*

Among the minor points of interest in this case were the extreme oedema of the retina, the hemorrhage in the macula, and the absence of papillitis. That the oedema should be most manifest in the layer of Henle is easily understood, since little resistance would here be offered

* I do not regard this as necessarily lending support to the theory of Uribe Troncoso that glaucoma in general is due to an excess of albumin in the intraocular fluids. In ordinary cases of glaucoma the amount of albumin in the vitreous humor is slight, and is probably secondary to the venous congestion produced by the high intraocular pressure.

to the pressure of the transuded fluid. The hemorrhagic extravasations occurred in all the retinal layers, but were never forcible enough to rupture the hyaloid membrane or the membrana limitans externa. This would indicate that they were always due to diapedesis and not to rupture of vessels, and as a matter of fact no ruptured vessels were found. This fact would explain the hemorrhage in the macula where only small vessels are present. The localized oedema in the nerve stem, corresponding to the portion in which the obstruction occurred, seems hitherto not to have been noted. The absence of papillitis is an interesting fact, since it indicates that papillitis cannot be secondary to retinal oedema.

CASE 2.—Hemorrhagic retinitis followed by acute inflammatory glaucoma. Posterior sclerotomy. Iridectomy. Enucleation five months after onset of symptoms. Death one year later. Anatomical findings: Advanced glaucoma, with deep cupping of optic nerve. Almost complete obstruction of central retinal vein due to endophlebitis, with dissecting aneurism posterior to obstruction. High-grade endarteritis of central retinal artery, with dissecting aneurism and formation of new central artery within the old one.

Annie C., aged seventy, admitted to the Massachusetts Charitable Eye and Ear Infirmary, April 28, 1902, service of Dr. Cheney. On March 4th patient had visited Out-Patient Department, at which time it was noted that the left eye showed retinitis (oedema), with a few small retinal hemorrhages and marked dilatation and tortuosity of the veins. The eye was somewhat red and painful at this time or shortly afterwards. Patient now complains of much pain, and states that she has not been able to see with left eye for about a month. Examination: Left eye shows considerable ciliary injection. Cornea hazy. Iris discolored; pupil small and unreacting. T+. No fundus reflex. Light perception only. Right eye white; vision with + 3 sph., 20/100. Visual field normal for form. Fundus not examined, owing to small pupil. General condition of patient good.

April 30th.—Posterior sclerotomy. No relief from pain followed.

May 7th.—Iridectomy.

May 9th.—Considerable amount of blood in anterior chamber. Much injection.

May 14th.—Tension and ciliary injection less; no pain. Discharged.

June 18th.—Readmitted on account of severe pain. Slight ciliary injection, cornea hazy and anæsthetic. No fundus reflex. T + 2.

June 23d.—Objective signs unchanged; no pain. Discharged.

July 26th.—Readmitted. Pain severe.

July 28th.—Enucleation.

It has since been learned that the patient died about one year later.

PATHOLOGICAL EXAMINATION.

After fixation in formalin the globe was sectioned in a horizontal plane passing through the upper part of the optic nerve. Diameters of globe: vertical, 25mm; horizontal, 25.10mm; antero-posterior, 25mm.

The cornea, 12mm in diameter, is clear but somewhat thinned in the centre (.6mm). The upper margin of the iridectomy coloboma is caught in the corneal incision. The root of the iris is firmly adherent to the cornea, etc., for a distance of 1mm all around. The anterior chamber contains a small hyphema. The lens, 9mm X 4mm, is apparently normal. The vitreous humor is of normal consistency but cloudy, owing to presence of blood and gray and white flocculi. The choroid is apparently normal. The retina is in situ and studded with hemorrhages, which occur up to within 6mm of the ora serrata, and are most numerous in the region of the equator. The small hemorrhages are punctate in form and about .6mm in diameter; the larger appear as conglomerations of the smaller. The retina appears thinner and more transparent than is normal. It shows no white patches except a very small one 5mm from the disk. The retinal vessels appear as white threads on the disk, from which they can be followed into the retina when they do not appear unusually

tortuous. The disk shows a deep cup (1.5 mm) with overhanging edges. The latter, as well as the surrounding retina, is greatly swollen. The optic nerve is translucent and its striations are obscured—is evidently completely atrophic. It is cut 3 mm long.

Histological Examination.—As in Case 1, longitudinal celluloidin sections were made of the optic nerve until the central vessels were approached, when the remaining portion was reembedded and serial cross-sections made, 8 microns in thickness. From the middle of the cup, all the sections were stained and examined with the exception of two, which were accidentally destroyed. The remainder of the eye was sectioned in the usual manner.

The cornea is apparently normal. The anterior chamber contains a considerable amount of blood and numerous pigmented cells. The iris is highly atrophic, and shows migration of cells from the pigment layer into its stroma. Its root is fused with the cornea and ligamentum pectinatum. Here in places the iris stroma has entirely disappeared, leaving only the pigment layer. The spaces of Fontana are obliterated, evidently by compression. The canal of Schlemm is represented by a narrow slit containing blood. The ciliary body and its processes are greatly atrophied. The pars ciliaris retinae shows very little hyperplasia. The choroid is greatly thinned, and the membrane of Bruch in places stains deeply in hematoxylin, indicating degeneration. The pigment epithelium also shows marked degenerative changes, probably senile in nature. The posterior ciliary vessels show comparatively slight degenerative changes, the most noticeable consisting in an irregular increase in the elastic elements of the arteries.

The retina is atrophic throughout and shows an increase in its supporting tissue, especially near the ora serrata, where it is converted almost entirely into neuroglia. The multipolar ganglion cells have everywhere disappeared. Edema is marked only near the disk, and here it does not reach the extreme grade seen in Case 1. Near the disk the outer nuclear layer with the layer of Henle shows numerous large and small spaces between the nuclei and fibrils. Elsewhere the relationship of the various retinal layers is little disturbed, and the

internal and external nuclear layers appear comparatively normal. The nuclei and fibrils of the latter layer, however, stain intensely blue in phosphotungstic acid hematoxylin, a possible indication of degeneration. The rods and cones are apparently normal. Beginning at the disk margin there is a layer of vascularized connective tissue that for a short distance grows over the surface of the retina. The retina is here thrown into folds and shows marked gliosis, evidently due to the contraction of this tissue. The hemorrhagic extravasations are most numerous in the nerve-fibre layer from which they sometimes extend into the external layers also. The hemorrhages have nowhere broken into the vitreous humor or become subhyaloid. The blood corpuscles show no disintegration, but in some of the extravasations they stain much more deeply than in others. The retina shows no colloid material or hematoidin granules, but cells packed with pigment giving the iron reaction are numerous. The nerve-fibre layer is often stained diffusely blue by the differential stain for iron.

The retinal vessels show marked degeneration. This is most often of the hyaline type, the whole vessel wall not infrequently consisting of hyaline substance free from nuclei, which fails to stain. Occasionally the lumen is entirely obliterated, the vessel then being represented by a hyaline column. This condition is most frequent towards the periphery of the retina. Some of the larger vessels show changes analogous to those in the central artery—that is, proliferation and degeneration of the old intima, with formation of a new fairly normal intima around the narrowed lumen. In many of the vessels the blood has lost its hemoglobin and fails to stain, so that when their walls are hyaline the vessels are difficult to make out. Sections stained lightly in Mallory's connective-tissue stain bring out these vessels well, the hyaline walls staining distinctly blue. The vessels along the side of the optic excavation are even more degenerated than the retinal vessels proper. In some of these the lumina are obliterated by large transparent cells, evidently swollen endothelial cells.

The optic nerve. The nerve fibres of the optic disk have been entirely replaced by proliferated neuroglia, a layer of

which now lines the deep excavation. The nerve stem shows advanced atrophy, evidenced by the marked thickening of the fibrous septa and the overgrowing of the nerve bundles with neuroglia. It is also highly oedematous. The fibrous tissue accompanying the central vessels is much increased in amount, and is fused with their adventitia.

THE CENTRAL VESSELS.

At the bottom of the excavation in the disk the central vein is found with an extremely small (.06mm) but still patent lumen lined with endothelium and filled with blood. The narrowing of the lumen is due to a marked thickening of the intima, which is composed chiefly of fusiform cells with poorly staining nuclei and transparent cytoplasm arranged concentric with the lumen. Between the cells fine fibrillæ can be seen. The thickening is much more marked on one side, so that the lumen has an eccentric situation. No definite fat spaces can be recognized; apparently the intima is in a stage preliminary to the hyaline condition found farther posterior. Ten sections farther back the lumen is still farther encroached upon by a growth of cells which apparently arise directly from the endothelium. These cells are connected with only one side of the lumen and form an irregular projection into it. The lumen is never entirely closed by the projection, but the space left in some of the sections is so small that the circulation must have been much impeded, if not practically cut off. The cells forming the projecting mass are sharply contrasted with those forming the chief thickening of the wall, owing to the fact that both their nuclei and their cytoplasm stain more strongly. In most of the sections the mass shows an indistinctly fibrillated intercellular substance. The degenerated intima at the periphery now takes on a hyaline fibrous character, its nuclei largely disappear, and it becomes blended with the adventitia, from which in fact it cannot be distinguished. The central projection lasts for eleven sections when it gradually becomes smaller and finally disappears. In the following section a small collateral is seen to join the vein (Fig. 12). This does not enter directly into the lumen but passes into the intima, which now again shows a reticulated structure with large

spaces. The next sections show the single space into which the collateral entered divided into two, so that including the original lumen which is displaced to one side there are now three lumina (Fig. 13). All three lumina are lined with definite endothelium and contain blood. Here and there they communicate with each other through small breaks in their walls. Posteriorly these breaks become larger and it is in this manner that the lumina finally disappear. The last trace of them is a little spicule projecting from the vein wall. This peculiar condition in the vein, which is evidently in the nature of a dissecting aneurism, is included within 20 sections, a distance of about .16mm. In this portion of the vein no collateral enters other than that mentioned. After this the vein takes on a comparatively normal appearance although in places it shows more or less thickening of the intima.

The central artery shows a free lumen to the end of the nerve, which, however, posteriorly is much reduced in size. The intima shows degenerative changes in all of the sections, but in some they are not marked. The changes met with are chiefly of two kinds. The most common consists in the occurrence of a transparent highly vacuolated substance between the lumen and the internal elastica. In some sections the vacuoles are found to contain large cells with granular cytoplasm and degenerated nuclei, thus suggesting that the transparent substance is due to fatty degeneration of the intima. Where this degeneration is most marked, a new and normal-appearing intima is formed immediately beneath the endothelium, so that the appearance is produced of a vein in the centre of an artery. The other kind of alteration consists in the formation of a homogeneous hyaline or faintly granular layer internal to the internal elastica, with which it often appears to be fused. The media of the artery is everywhere highly atrophic and in places scarcely recognizable. The internal elastica is for the most part intact, but in places it stains deeply in alum hematoxylin, breaks up into granules, and disappears over small areas. There is nowhere an extensive new formation of elastic fibres in relation with the internal elastica. Near the end of the nerve the tissue between the new-formed intima and the internal elastica becomes completely degenerated and disappears,

leaving a space filled with blood. The source of the blood cannot be determined, owing to the fact that the nerve was not cut sufficiently long. Weigert's elastic-tissue stain shows that here there is a new internal elastica formed beneath the endothelium. Around the new elastica there is a layer closely resembling the media of a small artery which contains a number of very fine elastic fibrils. In this situation, therefore, a new central artery has been formed within the lumen of the old one. The lumen of the new artery is .08mm in diameter, its wall is .01mm thick, and the space around it filled with blood is .03mm wide.

REMARKS ON CASE II.

The clinical record of this case is unfortunately incomplete. All that can be said with certainty is that there was hemorrhagic retinitis with venous stasis, followed in four weeks by acute congestive glaucoma. This was temporarily relieved by iridectomy, but enucleation was finally necessary for the relief of pain five months after the retinal hemorrhages were first noted. The anatomical examination showed advanced glaucoma with deep cupping of the optic nerve, a condition that it is difficult to believe could have come about within five months. It is likely, therefore, that in this case the obstruction of the central vein was either secondary to or independent of the glaucoma. This was indicated also by the fact that the obstruction was not yet complete. It seems altogether probable, however, that the acute symptoms of glaucoma which finally led to enucleation were due to the venous stasis in the retina. Vision was also much reduced in the other eye, but the clinical record gave no definite clue as to whether or not this was due to chronic glaucoma. As in Case 1, the obstruction in the vein was not due to thrombosis, but to endophlebitis. While the lumen was nowhere completely obliterated, it was practically so just behind the base of the excavation in the nerve. The narrowing of the

lumen was evidently due to two processes which occurred at different intervals of time. The first process was a more or less uniform, though eccentrically situated, proliferation of the intima with hyaline degeneration of the new tissue. The second, which must have occurred much later, was a proliferation occurring in the form of an irregular cellular mass, evidently derived from the endothelium, which projected from one side of the lumen. It is no doubt such a mass as this, seen in a later stage perhaps, that has often been mistaken for a thrombus. A few sections farther back the lumen became of almost normal size, but was subdivided by septa into three separate compartments (Fig. 13). As will be pointed out again, such a condition has also been described by Coats,¹⁶ Sidler-Huguenin,¹⁷ and Harms,¹⁸ who explained it as due to canalization of a thrombus. The complete set of serial sections made in this case, however, showed that this explanation was incorrect. The condition was clearly due to the undermining of the degenerated intima by the blood stream from a small collateral (Fig. 12). This, instead of separating the intima all around, bulged out the latter in two places only, due, no doubt, to the intima being more firmly adherent in some places than in others. The new lumina became lined by endothelium, probably by extension from the collateral and through breaks in their walls. It is evident that any number of lumina might be formed in this way. In Coats's case there were five; in Harms's six. In the case of Sidler-Huguenin the intima was evenly undermined all around anteriorly, but posteriorly there were three lumina. It would seem that a previous collapse of the vein may play some part in the occurrence of this condition; for it is evident that should the vein collapse, the blood from a collateral might force its way as readily beneath the intima as into the original lumen. In the present case, it is true, there was not complete obstruction of the vein, but the obstruction must have been great

enough to have allowed at least partial collapse of the vein before the collateral circulation was fully established.

The changes in the central artery were also of much interest in this case. So far as I am aware, the formation of an entirely new central artery within the lumen of the old, and surrounded by blood, has not hitherto been described. It is no doubt to be explained as follows: Owing to the complete degeneration of the tissue between the internal elastica and the new intima, a free space was formed which was soon filled with blood, probably from a collateral.* The tissue thus separated from the internal elastica then not only underwent further proliferation, but also differentiation, due perhaps to its better nourishment, so that a new internal elastica and apparently a new media were formed. A dissecting aneurism was also described by Sidler-Huguenin¹⁷ in the central artery of his case, but it was of a different type from this, consisting essentially in a separation and rolling up of the internal elastica.

In addition to the two cases reported above in detail, I have examined, by means of serial cross-sections, four other cases with obstruction of the central vein. All were cases of advanced glaucoma with more or less indefinite clinical histories. The condition was monocular except apparently in one case in which the other eye had been enucleated four years previously for glaucoma with hemorrhagic retinitis. Two cases were in females. The ages were from sixty-three to seventy years. One patient became insane shortly after the enucleation, evidently due to degeneration of the cerebral vessels, and died about three years later. The obstruction of the vein was complete in all but one case, was situated within and behind the lamina cribrosa, and was due partly to sub-endothelial thickening of the intima and partly to endothelial proliferation into the lumen. In one case the

* In a more recent case of a similar nature I was able to find a fairly large collateral in communication with the space around the separated intima.

central artery was also completely obliterated by obliterating endarteritis. In another case, in which the obstruction of the vein was complete, there were no retinal hemorrhages, the retina showing only oedema and venous congestion, but there was a large hemorrhage into the vitreous humor from the disk, due to rupture of a main branch of the central vein. The other features of these cases do not seem of sufficient importance to merit a detailed description.

DISCUSSION OF PREVIOUSLY REPORTED CASES.

In the literature I have been able to find anatomical descriptions of thirty-nine cases which either presented the clinical picture of thrombosis of the central vein or in which a thrombus was supposed to have been found under the microscope. In thirteen of these cases the central vein was found patent. In each of the other cases an obstruction was described which in all but two was attributed to thrombosis. Of the twenty-six cases in which an obstruction was described, those reported by Michel,¹ Angelucci² (two cases), Weinbaum,³ Wagenmann,⁴ Türk,⁵ Würdemann,⁶ and Goh⁷ have already been carefully analyzed by Reimar,⁸ who concluded that obstruction of the central vein could be regarded as certainly present only in the cases of Michel, Weinbaum, and Türk, and that it was doubtful whether the obstruction was due to thrombosis or phlebitis proliferans. In this conclusion I concur, except that I regard it as possible that the obstruction in Weinbaum's case was apparent only, and the appearance described due to a plane section of the vein wall which was cut longitudinally. The same explanation seems to apply also to the case of Purtscher,⁹ and no doubt to that of Bankwitz,¹⁰ neither of which was considered by Reimar. The sarcoma-like cells described by Weinbaum could well have been the endothelial cells lining the vein. The appearance depicted by Purtscher

is frequently met with in longitudinal sections of vessels, due to the section passing through a fold in the wall. Bankwitz gives no illustration of his case, and his description of the "thrombus" is otherwise inadequate. He held that the latter was due to pressure from a small aneurism of the artery in the disk. Probably the aneurism was a fold in the wall of the artery. That there was no venous obstruction was indicated by the lack of retinal oedema.

Viewed in the light of the present cases, I think there is little doubt that in the cases of Michel and Türk the obstruction was due to obliterative endophlebitis. There certainly was not the slightest anatomical proof of thrombosis. As Reimar pointed out, there was no blood pigment in the new tissue, and no evidence of reactive inflammation about the vein in either case, although in each the lumen was completely closed. Dimness of vision came on suddenly, it is true, but my Case 1 shows that this may happen after obliterative endophlebitis. It seems not unlikely that the case of Goh⁷ was really one of thrombosis of the central vein, although it is of little clinical importance. The thrombosis was only partial, and occurred, probably shortly before death, in a fatal case of stomatitis ulcerosa associated with general sepsis. There was no retinal oedema, and the retinal hemorrhages, which were present in both eyes, could not be explained by the thrombosis, since the central vein on the other side was patent, but were clearly due to the general sepsis. Another case of septic thrombosis, that of Gonin,¹¹ was also too complicated to be of much value from the standpoint of obstruction of the central vein. The thrombosis occurred after an attack of erysipelas complicated with orbital abscess. Ophthalmoscopic examination showed marked retinal ischaemia, with a few hemorrhages about the disk. The eye was obtained post-mortem about three months after the occurrence of the retinal hemorrhages, and on microscopic examination an organized

thrombus was found completely occluding the central vein 3mm behind the globe. A thrombus was also found in the central artery, which, however, was thought to be more recent than that in the vein. In view of the retinal ischaemia, it would seem more likely that the artery was occluded first.

In addition to his first case, Michel has reported two others as cases of thrombosis of the central vein. His second case¹² was one of leukaemia, in which retinal hemorrhages were found post-mortem. The thrombus, which consisted of round cells, red blood corpuscles, and granular detritus, was found at the point of exit of the vein from the nerve, and was probably a post-mortem clot. Michel evidently does not himself attach much importance to this case, since in a later communication¹³ on the subject he fails to mention it. In Michel's third case¹³ the ophthalmoscopic picture was that typical of albuminuric retinitis. Neither the central vein nor artery showed proliferation of the intima. The thrombus was said to have been made up of blood plates, and was thought to be only three days old. Hence it could not account for the retinal hemorrhages which occurred long before, although the exact date is not stated. The eye was obtained post-mortem, and it seems probable that the thrombus in this case was also formed after death. In the case reported by Gauthier¹⁴ the thrombus was evidently an artefact, probably a coagulum due to the fixing agent. The case of double thrombosis of the central vein described by Yamaguchi¹⁵ seems improbable. The patient, aged twenty-five, was suffering from sarcoma of the brain. This gave rise to double choked disks, which led to double optic atrophy. Later the swelling of the disks reappeared, with picture of thrombosis of central vein in each eye. On microscopic examination the central vein on each side was found compressed by scar tissue at its point of exit from the nerve, while attached to the wall at this point were laminated

thrombotic masses. An objective description of the thrombus unfortunately was not given. Since obstruction of the central vein has never been known to produce choked disk, even when occurring just behind the latter, it seems clear that the recurrence of the choked disk was here due to the increase in the size of the brain tumor, and that the hemorrhagic retinitis was due to pressure on the vein in the disk.

Coats¹⁶ has reported the microscopic findings in five cases of hemorrhagic retinitis. Actual obstruction of the central vein was certainly demonstrated in only two cases (Cases 3 and 5). Case 1 showed the typical picture of thrombosis of the central vein, but no thrombus was found. The intrascleral portion of the nerve was cut longitudinally, so that Coats himself suggests that an obstruction here might have been overlooked. This seems likely, inasmuch as the cross-sections of the nerve farther back showed proliferation of the intima of the vein. In Case 2 there was neuro-retinitis in each eye, with history of syphilis thirty years previously. In the left eye the neuro-retinitis was more marked and was associated with retinal hemorrhages. In this eye just behind the lamina the central vein was found divided by septa into five loculi containing blood, which Coats regarded as representing an organized and fully canalized thrombus. The ophthalmoscopic picture in this case was certainly not typical of thrombosis of the central vein, on account of the swelling of the disk. The fact that optic neuritis was also present in the other eye would seem to indicate that this was the primary condition in each, and that to it were due the retinal hemorrhages in the left eye. The condition existing in the central vein, as already mentioned, was similar to that in my Case 2, except that the vein was not occluded anteriorly. It was probably brought about in a similar way, however. The history of the case shows that there was complete loss of sight in both eyes about ten months previous to the

enucleation, which was probably due to double optic neuritis. No doubt the collapse of the vein which took place at that time allowed the degenerated intima to become undermined, as in my case. Coats's Case 3 was one of advanced glaucoma, with deep cupping of the disk, in which the retina was found covered with hemorrhages. Behind the lamina cribrosa the vein was entirely replaced by a knot of reticulated fibrous tissue, regarded by Coats as an organized thrombus. The lumen of the vein gradually became narrower until it was completely obliterated. Although it is stated that there was no endothelial proliferation, Coats's Fig. 7 shows plainly enough that the narrowing of the lumen was here due to thickening of the intima. In regard to the thrombus itself, Coats says: "That it is not merely an obliteration by endothelial proliferation is shown by a high-power examination of its structure, which shows it to be made up not of thick-walled vein, but of young connective tissue." This fact, however, as shown by my Case 1, for instance, does not exclude proliferation of the intima. In Coats's Case 4 the ophthalmoscope showed monocular hemorrhagic retinitis and œdema. One month later glaucoma ensued, which in twelve days required enucleation. Within the lamina cribrosa the central vein completely disappeared, but sufficient sections were not examined to determine the exact manner of its disappearance. In the following sections two small veins accompanied the artery. The artery showed marked endarteritis and contained an "organizing thrombus." Coats regarded the case as one of primary thrombosis of the central vein in which the thrombus had organized and become completely converted into connective tissue. The "thrombus" in the artery was thought to be secondary to the venous stasis. The disappearance of the central vein was possibly due to an unusual course taken by it, perhaps similar to that in Harms's Case 13, and illustrates the importance of having

no breaks in the series of sections in such cases. In Coats's fifth case the central vein also completely disappeared within the lamina cribrosa, reappearing farther back with a small lumen and very thick wall. Coats described the thickening of the wall as due to increase in the adventitia, not to endothelial proliferation. More probably it was due to proliferation of the intima, followed by hyaline degeneration of the new tissue, as in my Case 2. Anteriorly the lumen of the vein contained a "little shrunken knot of tissue" attached to the vein wall on one side only, which was regarded as an organizing thrombus. The illustration shows proliferation of the intima of the vein at this place, and it seems altogether probable that the projection into the lumen was due to endothelial proliferation. Still farther forward the lumen was found divided by two trabeculae into three loculi, each lined with endothelium and containing blood. Coats offers no explanation of this condition, although according to the description it was similar to the "canalized thrombus" in his Case 2. In all probability it was due to dissection of the intima, as in my Case 2.

The case of Sidler-Huguenin¹⁷ was analogous in many respects to my Case 2. The condition in the vein was described as a canalized thrombus, and the possibility of a different origin for it was not considered. In this case also there was a dissecting aneurism in the artery. The important features of the case were as follows: Female, aged sixty-nine, with an indefinite history of loss of sight and symptoms of acute glaucoma in one eye. Tension + 3. Retina covered with hemorrhages. No venous stasis. Light perception only. Other eye normal. Enucleation twenty-five days later. Pathological examination: Anterior part of eye not described. Retinal hemorrhages and marked sclerosis of retinal vessels. Optic disk deeply cupped. Intrascleral portion of optic nerve sectioned longitudinally, the remainder in serial cross-sections. Central vein showed a "canalized

thrombus" a short distance behind the lamina cribrosa. This consisted of a central strand of tissue, containing for the most part one lumen, but in some sections as many as three lumina, all lined with endothelium. The periphery of the strand as well as the surrounding vein wall was also lined with endothelium. Anteriorly the central lumen of the strand gradually became larger, and its wall finally became continuous with the intima of the vein proper. It was also attached over a small surface to the vein wall at one other place. The vein wall showed no vascularization or any evidences of chronic inflammatory reaction, and there was no pigment in the "thrombus." A similar explanation evidently applies to this case as to my Case 2. A fairly large collateral entered the vein at the point where the "thrombus" ended posteriorly, and it was no doubt here that the intima was first undermined and ruptured. Further separation was then probably produced by cicatricial contraction of the thickened intima. Whether or not the condition was preceded by collapse of the vein is of course uncertain in this case. It is noteworthy, however, that the portion of the vein which in my case was almost completely occluded was here sectioned longitudinally.

The most recent contribution to the subject of obstruction of the central retinal vein is that of Harms,¹⁸ who reports eight cases.* In two cases there was also partial and in two complete obstruction of the central artery. All of the cases were examined by means of serial cross-sections, every fifth section being stained. In two of the cases the obstruction in the vein was attributed to endo- and meso-phlebitis alone, in six to endo-

* Since this was written a further communication on the subject by Coats¹⁹ has appeared, too late, unfortunately, to be fully discussed in this paper. Coats reports eleven new cases, in all except one of which the obstruction is ascribed to thrombosis. In all of the cases, however, the obstruction was evidently of long duration, and in my opinion could well have been due to proliferative endophlebitis without thrombosis.

phlebitis with thrombosis. Harms does not make it clear, however, how he was able to distinguish between the two processes. He states that in all of his cases the new tissue in the vein was organized by proliferation of the endothelium, and that the adventitia around the obstruction in no case showed vascularization or evidences of inflammatory reaction. In no case also did the "thrombus" contain definite blood pigment. These facts certainly point more strongly to obliterative endophlebitis than to thrombosis. All of Harms's cases were evidently of long standing so that few indications of the early conditions could have remained. Thus in none of them was the obstruction so recent that the vein was still collapsed behind it, and in all of them the optic nerve was highly atrophic. In three of the cases there was slight, and in three deep cupping of the nerve. In one case, Case 8, the "thrombus" was described as canalized. Harms's Fig. 23 shows that the condition corresponded to that in my Case 2. It is also very similar to Coats's Fig. 5. Anterior to the "canalized thrombus" the vein was almost but not quite obliterated by proliferated intima. The explanation of this case, therefore, is apparently the same as that given for my Case 2 and for the case of Sidler-Huguenin. Harms's Fig. 20, Case 7, and Fig. 28, Case 10, also show conditions apparently due to separation of the intima, which Harms regarded as organized thrombi. In some of his cases the obstructing masses were separated from the vein wall posteriorly. This was no doubt due to the previous collapse of the vein behind the obstruction. It is obvious that when the vein again became distended with blood the wall would have tended to become separated from the contracted central core.

Thus out of 26 cases from the literature in which the anatomical diagnosis of obstruction of the central retinal vein was made, the evidence was inadequate to show that actual obstruction sufficient to account for the retinal

changes was present in more than fourteen. In only two of these was the obstruction certainly due to thrombosis, and in these it occurred as a result of sepsis. In the remaining twelve cases there was no evidence to show that the obstruction was not due entirely to proliferative endophlebitis. These were the cases of Michel,¹ Türk,⁵ Coats¹⁶ (Cases 3 and 5), and the eight cases of Harms.¹⁸ It is therefore impossible to say that thrombosis of the central retinal vein ever occurs except as a result of sepsis. On *a priori* grounds, too, it seems unlikely that this process should occur spontaneously in a vessel so small as the central vein. For while degenerative changes in the intima may be relatively great, they are absolutely very slight compared to those in the larger vessels of the body, and the lumen of the vein so long as it is patent probably never loses its endothelial lining. The tendency seems to be in the case of the small vessel for a new and fairly normal intima to be continually reformed around the lumen, no matter how marked the degenerative changes may be between it and the adventitia. This is probably due to the better nourishment supplied to the tissue nearest the lumen. In certain cases in which a comparatively normal intima is formed immediately around the greatly narrowed lumen, the proliferated intima at the periphery takes on a hyaline fibrous character and fuses with the adventitia. Here the pathological condition may be overlooked and the vein regarded simply as having an unusually small lumen. In other cases the proliferation of cells near the lumen, evidently derived from the endothelium, is sometimes more atypical, so that an irregular mass projects into and partly or completely occludes the lumen. It is no doubt this central, better preserved cellular tissue, standing out in contrast to the more or less degenerated intima around it, that is often regarded as a thrombus. The variation in the character of the endophlebitic process in different cases probably depends upon variation

in the activity of the proliferation and upon the rapidity with which degenerative changes take place.

Of the eighteen cases of obstruction of the central retinal vein, including the six present cases and excluding the two cases of septic thrombosis, six were females. With the exception of Harms's Case 9, aged twenty, in which glaucoma was perhaps the primary factor, the ages were between forty-eight and seventy years. The average age was fifty-eight years. The right eye was attacked in seven cases. Albuminuria was present in three cases, absent in eight, and not noted in seven cases. In most of the cases the conditions of the vascular system, including the peripheral arteries, was not noted, but in five cases there were definite signs of general arteriosclerosis. No mention is made of syphilis or alcoholism as etiological factors in any of the cases. It seems safe to conclude, therefore, that the chief etiological factor was senility. Few of the cases were followed sufficiently long to afford any data in regard to prognosis as to life, but the presumption is, of course, strong that this must be unfavorable. In two cases the eye was obtained at autopsy, and in two others the patient died within three years after the enucleation. One patient was alive at the end of five years. Another was alive at the end of eight years, but during that time had several severe apoplectic attacks as well as an attack of hemorrhagic retinitis in the other eye. In all except one case, that of Michel, the obstruction was situated either entirely within, or more often behind and partly within, the lamina cribrosa. As pointed out in connection with Case 1, this might have been due to the fact that at its junction with the globe the nerve must be subjected to its greatest strain during the ocular movements.

The fact that obstruction of the central retinal vein has been demonstrated in so few cases is not necessarily an indication that the condition is excessively rare. More probably it is chiefly an indication of the infrequency

with which the optic nerve is examined in serial cross-sections. So, too, as Ischreyt¹⁹ has pointed out, the frequency with which glaucoma occurs in the cases anatomically examined may be misleading, due to the fact that, as a rule, only those cases come to enucleation in which glaucoma ensues. That glaucoma does not always follow is shown by Michel's first case, in which the eye was obtained post-mortem sixteen months after the onset of the retinal hemorrhages. There was no glaucoma in Türk's case also, but death occurred soon after onset. In all the other cases there was glaucoma. More important than the frequency of the glaucoma in these cases is the fact that in all but one of them it was monocular. The conclusion from this fact would seem to be almost inevitable that the obstruction in the central vein was the cause of the glaucoma in most of them. Moreover, my Case 1 shows conclusively that acute glaucoma may be due to this cause. On the other hand, the fact that in many of the cases acute symptoms did not occur until the glaucoma had reached an advanced stage, as evidenced by deep cupping of the nerve, would seem to indicate that in some of these the obstruction was secondary to or independent of the glaucoma. Such a case, for example, was perhaps Harms's Case 9, in which the age of the patient was only twenty years. Further observations, however, are necessary before the question of the relation of chronic glaucoma to obstruction of the central retinal vein can be fully answered.

The question naturally arises as to the explanation of the cases presenting the ophthalmoscopic picture of obstruction of the central vein in which no obstruction has been found. Since most of the eyes were obtained by enucleation during life, as a rule only a small part of the central vein could be examined, so that in some cases it is possible that an obstruction was present farther back. Theoretically it might be expected that the point of exit of the vein from the nerve would be a favorite place

for endophlebitis, since here it must be exposed to considerable trauma during the movements of the eye. But until cases are forthcoming in which obstruction has actually been found at this situation the matter must remain one of speculation. Certainly it can be said from another standpoint, that in many of the cases of hemorrhagic retinitis associated with glaucoma the degenerated condition of the smaller retinal vessels would seem amply sufficient to account for the hemorrhages.

A certain number of cases of hemorrhagic retinitis have been reported in which the central artery was occluded while the central vein was supposed to be free. Some observers have regarded the condition as an hemorrhagic infarct. Reimar explained his case by assuming that before the stage of complete obliteration the artery became closed temporarily, owing either to the contraction of its musculature or to a lowering of the general blood pressure. On the return of the circulation, diapedesis took place from the small vesels whose walls had been injured by the anaemia. Harms, however, takes exception to this view. He points out that in every case of obstruction of the artery the circulation returns sooner or later without, in the majority of cases, causing hemorrhage. He points out also that venous obstruction was not positively excluded in any of the cases of this kind. Harms explains these cases by assuming also a closing and opening of the artery, but he thinks the hemorrhages are due to the fact that the returning arterial blood stream meets with more resistance owing to the previous collapse of the degenerated veins.

CONCLUSIONS.

Complete obstruction of the central retinal vein, with the classical ophthalmoscopic picture of thrombosis of this vessel, may be produced by endophlebitis proliferans without thrombosis. The proliferation may involve

the sub-endothelial tissue alone, or the obstruction may be completed by a more active endothelial proliferation within the lumen.

All of the cases anatomically examined, in which obstruction of the central retinal vein has been attributed to non-septic thrombosis, can be explained by, and in all probability were due to, endophlebitis proliferans alone.

The so-called canalized thrombus of the central retina vein is in the nature of a dissecting aneurism.

In certain cases obstruction of the central retinal vein may early give rise to acute glaucoma.

NOTE ON TECHNIQUE.

The usual method of preparing serial celloidin sections is not only laborious but often inaccurate, owing to the danger of misplacing or losing some of the sections. The following method does away with both of these objections. The specimen is imbedded so as to leave an excess of celloidin at its periphery all around. This is most easily accomplished by placing it in a paper box smeared on the inside with vaseline. After hardening in alcohol the specimen is mounted on a block and the excess of celloidin trimmed away as usual, except that an extra amount is left on the side opposite from the microtome knife. In cutting the sections, the knife is not carried entirely through the celloidin block, but an uncut edge about 3mm wide is left each time. After twenty or more sections are cut in this way the knife is carried all the way through, thus producing a little book of sections. It is probably most convenient to keep each book in a separate bottle, but no difficulty is usually experienced in determining the proper order after the sections are mounted. Another way to keep them in order is to string them on a silk thread through their uncut margins. In beginning a new book a wider margin should be left for the first one or two sections, as otherwise the sections may not adhere. Each book is stained in the same manner as a single section, except that it is best to use slow-acting stains so that the staining will be uniform throughout. The individual sections are not separated until the book is in alcohol preliminary to clearing.

Then each section is either torn off with forceps, or the book is taken up on cigarette paper and the uncut margin removed with scissors. Each section in order is then removed, cleared quickly in oil of origanum, and placed on a slide. All the sections of one book are mounted on the same slide—a decided advantage. The sections can be cut as thin by this method as by the usual one. With a sharp knife they can easily be cut less than eight microns in thickness without destroying a single section.

DESCRIPTION OF ILLUSTRATIONS ON TEXT-PLATES I.—III.

The illustrations were all prepared from micro-photographs made by Mr. L. S. Brown of the Clinico-Pathological Laboratory, Massachusetts General Hospital.

Case I.

1. Longitudinal section through the optic nerve at a depth of one-fourth its diameter. Note the marked oedema of the retina, the retinal hemorrhages and the absence of papillitis. The retinal oedema is most marked towards the macular region on the left where the layer of Henle is widest. (x 20.)

2. Section through macula near its centre, showing destructive action of oedema in layer of Henle. (x 42.)

3. Cross-section of central vessels in lamina cribrosa. The vein is dilated and shows only slight proliferation of intima. Diameter lumen of vein, 180μ - 152μ . Thickness vein wall, 15μ , of artery wall, 20μ . (x 137.)

4. Section through posterior part of lamina cribrosa. The thickening of the intima of the vein is here plainly seen. Lumen much reduced in size, filled with serum. Diameter lumen of vein, 100μ - 80μ , of artery, 180μ - 120μ . Thickness intima vein, 20μ . Wall of artery, 20μ - 30μ . (x 137.)

5. Six sections farther back. Note the condensation of fibrous tissue immediately about the lumen of the vein and the large clear spaces between it and the adventitia. These contain cells evidently in a state of fatty degeneration. Diameter lumen of vein, 90μ - 70μ . Thickness intima vein, 37.5μ . Wall of artery, 20μ - 30μ . (x 137.)

6. Five sections farther back. Showing reticulated structure of proliferated intima under higher power. (x 215.)

7. Fifteen sections farther back. The proliferated intima has taken on a finely fibrillated structure. Lumen of vein almost obliterated. It still contains serum only. Diameter lumen of vein, 20μ . Thickness of intima, 50μ . (x 137.)

8. Three sections farther back. Lumen of vein no longer visible, but its endothelial lining can still be made out. (x 137.)

9. Six sections farther back. Lumen of vein completely obliterated by proliferated intima. (x 137.)

10. Eight sections farther back. The intima again shows a reticulated structure. The obliteration of the lumen was here probably secondary to collapse of the vein. (x 137.)

11. Twenty-two sections farther back. The lumen of the vein is now probably of almost normal size, but is completely collapsed. The apparent increase in the number of nuclei in the vein wall is not pathological but is due to its collapsed and distorted condition. (x 137.)

Case 2.

12. Nineteen sections behind base of optic excavation. Lumen of vein, 11.50μ , narrowed by proliferated intima which here has a reticulated structure. On one side is a collateral, containing serum and leucocytes, which enters the intima of the vein but does not communicate with the lumen. (x 195.)

13. Thirteen sections farther back. The single lumen is replaced by three smaller lumina, each lined by endothelium and containing blood. The original lumen is on the left. The other two have been formed by the undermining of the intima by the collateral shown in Fig. 12. In one place there is a break in the wall between two of the lumina. Numerous leucocytes adhere to the walls of the lumina. (x 195.)

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A DISSECTING SPATULA.

BY DR. OTTO LANDMAN, TOLEDO, OHIO.

(With one figure in the text).

ITS general usefulness and ease of manipulation lead me to describe the instrument and its application. The instrument is of the usual length; the blade is 25mm long, narrows slightly toward the tip, and is 5mm wide. It is stiff and yet flexible enough to yield to pressure. It is curved slightly on the flat making it more efficient. The blade is thin thus furnishing edges which will not cut but will readily serve for dissection.



A few conditions in which it has been used will be mentioned.

In **evisceration** after the conjunctiva is cut circularly around the cornea, the conjunctiva is readily separated by passing the spatula under it in all desired directions. The cornea is cut away in the usual manner and the sclera is grasped in forceps at any convenient point. The spatula is slid between the ciliary body and the sclera and is gradually passed backward between sclera and choroid, lifting the latter off of the sclera by sweeping the blade around the entire concavity of the eyeball. It separates the *venæ vorticoseæ* easily although they are firmly united to the sclera.

In **pterygium operations** after detaching the apex from the cornea with a knife, the growth and conjunctiva can easily be dissected off. In the "McReynolds" operation, the conjunctiva above the upper border of the growth and the conjunctiva of the lower pocket are quickly separated by merely passing the blade beneath the tissue.

In **advancement of a muscle**, the conjunctiva is readily freed by means of the spatula.

In **separating cysts** from the surrounding tissue it dissects without cutting and if the cyst wall be seized by a Péan's forceps, the spatula will enable one often to remove the cyst without rupturing its wall. In one case of a **dermoid of the orbit** it was of excellent service.

In a **deep-seated cystic tumor of the orbit** it proved extremely useful. With the finger as a guide the tumor was located, the spatula was passed in and around the cyst, freeing it entirely from the adherent surrounding tissue, without rupturing its walls. In short this instrument can be used on the eye or the orbit when any blunt dissection is to be made.

It is manufactured by E. B. Meyrowitz, 104 E. 23d St., New York.

ENUCLEATION OF THE EYE WITH COCAINE
ANÆSTHESIA; SUBJECTIVE SENSATION
ON SEVERANCE OF OPTIC NERVE.

BY DR. EDWARD KEITH ELLIS,

BOSTON, MASSACHUSETTS,

AND

Dr. HENRY GLOVER LANGWORTHY,
DUBUQUE, IOWA.

SOON after the advent of cocaine in ophthalmic surgery in 1884, this anæsthetic was used in enucleation of the eyeball by different men, both in this country and abroad, with varying degrees of success. From that time until the present, articles have appeared in the medical journals occasionally, reporting cases where it has been used.

The first instance of its having been done in this country, found on looking over the literature for the past twenty-seven years, is the case published by D. C. Cocks.¹ His patient was operated upon November 29, 1884. A solution of cocaine was dropped into the conjunctival sac every three to five minutes while the operation lasted, which was one-half hour.

The usual circumcorneal incision was made in the conjunctiva, dissecting the tissues back, and injecting the solution as fast as dissection proceeded, with an Anel syringe having a small needle. The operation was

¹ D. C. Cocks, *The Medical News*, Philadelphia, 1884, xiv., p. 654.

completed, cutting the optic and ciliary nerves, with very slight discomfort to the patient.

In 1886 A. D. Williams¹ reported a case similar to the one above given. This was followed by two separate publications in the London *Lancet*; the first by Tosswill, Bankart, and Roper,² in which were published the records of seven cases in which this method was employed, and the second by C. L. Lightfoot,³ in which the same thing was done.

In these cases a 10% solution of cocaine was dropped in the eye, the dissection of the conjunctiva proceeding as usual, until the ocular muscles were reached, when a 4% solution was injected along each one of them. The operation was then completed with no more discomfort to the patient than that produced by the ordinary tenotomy and advancement of the ocular muscles.

"Ossification of a degenerated choroid in an atrophied stump threatening sympathetic ophthalmia. Enucleation under cocaine; history of case," is the title of a paper published in 1889 by J. A. Campbell.⁴ The same method was followed here with a good result.

Edward Jackson⁵ of Denver reported the operation by the same method in two cases. In the first case the eye was very hyperemic, and anaesthesia was rather incomplete. In the second case the eye was free from hyperæmia, and the operation was completed with no worse discomfort than that experienced in tenotomy of the ocular muscles. A 4 to 10% solution of cocaine was used,—at first injected, and later simply dropped on the conjunctiva.

¹ A. D. Williams, *St. Louis Medical and Surgical Journal*, 1886, li., 17.

² Tosswill, Bankart, and Roper, *London Lancet*, 1888, i., 172.

³ C. L. Lightfoot, *London Lancet*, 1888, i., 824.

⁴ J. A. Campbell, *Journal of Ophthal., Otol., and Laryngol.*, 1889, i., 60-65.

⁵ Edward Jackson, *Annals of Ophthalmology and Otology*, Kansas City, 1892, i., 7.

In 1892 Armaignac¹ described this method in an article entitled "De l'anesthésie locale par la cocaine dans l'enucléation du globe oculaire." Another publication by the same author¹ appeared in 1893. A 3% solution of cocaine was used at the start, and later a 10% solution. Injections were used.

During the same years appeared an article by J. Dunn,² in which he states that for the three years previous to 1893 in the Richmond Eye and Ear Infirmary cocaine anæsthesia was used in all enucleations except those in young children and where panophthalmitis was present. A 4% solution was used before the conjunctiva was cut. The solution was then injected under it with the ordinary eye-dropper, and after waiting two minutes the tendons of the ocular muscles were severed without pain. A 20% solution was then applied about the entrance of the optic and ciliary nerves to the globe, and the operation completed.

In an article entitled "De l'enucléation avec anesthésie locale; indications et technique," F. Terrien³ has described the method as performed by him. He first gives a subcutaneous injection of 1 centigram of morphia. After waiting a few minutes he instills cocaine into the conjunctival sac and soon begins the operation. When the muscles are reached, cocaine is injected along their course through a small curved Anel needle. On reaching the optic nerve the following solution is injected about its entrance:

Hydrochlorate of cocaine	{	$\frac{1}{aa}$.01
Hydrochlorate of morphia			
Stovaine	{	$\frac{1}{aa}$.02
Sodium chloride			
Distilled water			5.

¹ Armaignac, *Jour. de méd. de Bordeaux*, 1892, xxii., 101-103.

² J. Dunn, *Virginia Med. Month.*, Richmond, 1892-3, xix., 959.

³ F. Terrien, *Arch. d'opht.*, Paris, 1906, xxvi., 84-90.

One cubic centimetre of this solution is used. The nerve is then cut with but slight discomfort.

It is probable that most observers have found that more discomfort is experienced in those cases where there is an active hyperæmia. In these cases it seems a good plan to use a 1 or 1/2% solution of holocain, since this drug acts better on inflamed tissue than cocaine.

The following cases illustrate the patient's sensations during the operation:

CASE 1.—Enucleation; cocaine anaesthesia; subjective sensations on nerve division.

July 7, 1905, there was admitted to the Massachusetts Charitable Eye and Ear Infirmary on the service of Dr. F. E. Cheney, a man aged seventy-two years. Occupation, ex-watchman. Past history: Ten years ago vision began to fail in the left eye. For a long time he was able to distinguish objects above the horizontal line of vision much better than those below. All vision completely lost for eighteen months. He has never had any trouble with the right eye.

Present Ocular History: Severe pain in the left eye for past three weeks. Pain is sharp and neuralgic in character, radiating down to the teeth and through the forehead.

Ocular Examination: Right eye white and quiet; apparently normal. Left eye, vision nil. Great injection with slight chemosis of conjunctiva. Cornea cloudy, with small spots seen on posterior surface below the median line. Anterior chamber very shallow. Pupil small and does not react. Fundus not seen. Tension + 2. Slight divergence and hypertropia. The whole globe projects forward about $\frac{3}{8}$ of an inch. Movements of globe are not restricted. Tissues about globe are soft, and upon palpation give the feeling of perhaps more than the normal amount within the orbit. For the next thirteen days the pain was severe in spite of treatment. Treatment consisted of pilocarpine, (1% solution) three times a day, with fomentations every 4 hours. There being a continuation of the severe pain, and the exophthalmos conveying the impression that

there might be some new growth in the orbit, it was decided best to enucleate the eye.

The patient was very desirous of having the operation performed under the influence of cocaine, if possible, feeling that his heart could not withstand ether, and although no lesion was found upon examination, his request was granted.

Operation: A few drops of a $1/2\%$ solution of cocaine was injected deep into the orbital tissue along the four recti muscles, with a curved hypodermic needle, after thoroughly anaesthetizing the conjunctiva with a 4% solution dropped at intervals of two minutes, into the conjunctival sac. The globe was then enucleated in the usual manner. No discomfort was experienced until the optic nerve was severed, and then only a very slight amount of pain was felt on the instant. There was no sensation of light, due to the fact that the nerve was atrophied. The only sensation experienced was when the nerve was cut, when the patient thought "that a piece of bone must have been included with the tissues between the blades of the scissors," as he expressed it.

The after treatment was as usual with any enucleation. No sign of a new growth was found. The patient felt no worse discomfort than that experienced on extraction of a foreign body from his cornea, as he said. He was so much interested in the whole proceeding, that he wished to take the enucleated globe in his fingers, to "look at the source of all his troubles."

CASE 2.—Male, age thirty-one; admitted to the Massachusetts Charitable Eye and Ear Infirmary November 5, 1906, on the service of Dr. H. H. Haskell.

Past History: Patient had had a large perforating ulcer of the cornea of the left eye twenty-four years previous. He has had intermittent attacks of pain and inflammation ever since. He has been treated at the New York Eye and Ear Infirmary for attacks of irido-cyclitis, and enucleation was advised there.

Present History: For the past six months there have been redness and severe pain at intervals in the left eye. Examination of the eye showed marked injection of the ocular conjunctiva; a large corneal opacity below the centre, with the iris bulged forward and the margin of the pupil adherent to

the scar. Tension minus. Great tenderness on palpation. Vision-perception of light. Pain marked. Enucleation advised and accepted. Patient desired to forego the ordeal of ether, if possible, and the use of cocaine was suggested and met with approval.

Operation: Three applications of a 4% solution of cocaine hydrochlorate were made to the eye, and the usual method of enucleation pursued. Many adhesions were encountered, but were divided with no discomfort to the patient. The ocular muscles were divided with very slight pain. Cocaine solution was then applied on a cotton swab as far posteriorly as possible, and a small amount injected about the nerve entrance. After a moment the nerve was divided. Pain was very slight.

The patient had previously been asked to take note of his sensations during the operation. He said there was no sensation of pain or discomfort until the muscles were divided, when there was a dull aching sensation, as each one was lifted and cut. After this he was not at all uncomfortable until the optic nerve was reached. When this was divided there was a dull crushing sensation (but no worse than a toothache), which was gone instantly. Simultaneously there was a slight flash of white light, succeeded instantly by total darkness.

The discomfort experienced during the operation was very slight,—especially so as compared with the knowledge of what was taking place. The idea of being conscious during the proceeding, and feeling the hemorrhage on the side of his face was the one terrifying thing about it, and not, he said, the discomfort produced by the operation itself, which was very slight.

CASE 3.—A boy, aged twelve, was admitted to the Massachusetts Charitable Eye and Ear Infirmary November 16, 1906, on the service of Dr. H. H. Haskell.

Two months previous he was kicked by a horse over the right eye. Vision had been slowly lost. There had been no pain.

Examination showed in the right eye a scar extending across the whole cornea and sclera, out over the external canthus into the skin about the temple. The scar was about two inches long. The globe had been perforated, as was evidenced by the fact that the iris was adherent to the scar

in the cornea across its whole extent. Slight ocular injection. Tension minus. Vision = perception of light. Enucleation advised and accepted.

The question of ether or cocaine anæsthesia arose, and the boy wished to try the latter.

Operation: Three applications of a 4% solution of cocaine hydrochlorate were made to the eye and the operation proceeded in the usual manner. No pain was experienced until the ocular muscles were lifted and divided, and here the pain compared with that experienced during any tenotomy. Cocaine was then applied on a cotton swab as far posteriorly as possible in all directions, and a small amount injected with a hypodermic needle about the ciliary and optic nerves, as was done in the other cases. After a moment the nerve was divided, and, as before, there was very little discomfort.

The subjective sensations as outlined by the patient of his own accord were as follows: No discomfort until the ocular muscles were divided. Then there was a dull dragging sensation. No more pain until the optic nerve was reached and divided, when he felt a sudden crushing sensation, which, although far from being pleasant, was not particularly painful. At the same time he perceived a sudden flash of white light which was instantly dispelled, and succeeded by total blackness. As the blades of the scissors were introduced around the nerve, the patient perceived "little points of light," due probably to rubbing the nerve with the blades of the scissors as they passed by it. He insists that he would go through the same experience again if it were necessary, rather than be etherized.

CONCLUSIONS.

In many cases where there is a great fear of ether anæsthesia on the part of the patient, it seems perfectly justifiable to enucleate under the influence of cocaine. This can be easily and very nearly painlessly done, especially if the patient is an intelligent one. From the results of the cases above cited it would seem that in the majority of simple enucleations, ether, with the sense of suffocation that accompanies the administration of it, and

the nauseating effects that generally follow it, is a rather unnecessary hardship. Of course, barring the disagreeable accompaniments of ether, there is nothing better than complete general anaesthesia for a surgical procedure of this kind, but in most cases cocaine anaesthesia will answer all purposes, since what little discomfort there is, is more than compensated for by the absence of the after effects of general anaesthesia.

In highly inflamed conditions of the eye, cocaine does not act as well, and here, as above stated, a 1% solution of holocain may be used instead, since holocain acts better than cocaine on inflamed tissues.

In very young patients the use of ether for obvious reasons is imperative, but later in life local anaesthesia works perfectly well. The solution for injection about the posterior portion of the globe, recommended by Terrien, seems to be an admirable mixture, and his method of first injecting morphia subcutaneously is a useful addition.

A CASE OF METASTATIC CARCINOMA OF THE IRIS.

By F. I. PROCTOR, A.M., M.D., BOSTON.

PATHOLOGICAL EXAMINATION.

By F. H. VERHOEFF, M.D., BOSTON.

METASTATIC carcinoma of any part of the eye is comparatively rare. As is well known the metastases are most frequently situated in the choroid, about forty such cases having been reported. Three cases have also been reported in which the metastasis occurred in the ciliary body. The following case, however, in which the iris was the only part of the eye attacked, seems to be the only case of its kind on record.

Mrs. M., seventy-two years of age, consulted me June 27, 1905, in regard to a small spot on the iris which had been first noticed by her daughter two weeks earlier. She appeared to be in good health, but had some slight pain in the abdominal region which she attributed to indigestion. The only point in her previous history bearing on her case was the fact that in 1903, Dr. Abbe of New York had removed a tumor of the breast. Both Mrs. M. and her daughter had the impression that this tumor was not malignant, but Dr. Abbe has since written that it was a carcinoma.

The spot on the iris was situated directly above the pupil and a little nearer to the pupillary border than to the ciliary region. In shape it was an irregular oval with its major axis horizontal. It was about 3mm long and 2mm wide. Its anterior surface projected slightly beyond the plane of the

iris and there were several coral-like excrescences on the anterior surface, of varying size, but the longest not more than $1/2\text{mm}$.

There was a fairly sharp line of demarcation between the tumor and the surrounding tissue. The color of the tumor was grayish-brown, considerably lighter than the surrounding dark brown iris. The projections on the anterior surface were grayish-white. The iris reacted normally. There were no inflammatory symptoms. Vision was normal. No changes in fundus.

In view of the history of tumor of the breast (presumably malignant) and the fact that the patient had no vision in the other eye (there had been some inflammatory process many years before resulting in total loss of sight), the condition appeared so serious that I advised a consultation with Dr. Wadsworth. He examined her the same day and telephoned me that he thought it best to watch the case, await developments, and see if the growth increased.

I then sent Mrs. M. to Dr. H. F. Vickery, to ascertain if there were evidences of metastases elsewhere. At this examination he found nothing to indicate metastasis, but two months later he felt distinct nodules in the upper part of the abdomen, which he thought were either in the mesenteric glands or the liver.

July 7th I saw the patient again and found no change in the size or appearance of the tumor.

I next saw her July 17th, three weeks after her first visit, and noted that the growth had increased slightly, but I did not feel that it warranted operating, so I left Boston with the understanding that she should see Dr. Wadsworth ten days later, and if he found the tumor growing I would return.

July 28th Dr. Wadsworth wrote as follows: "I find the growth has increased (horizontally) from 3mm June 27th to 4mm ; its surface has become more sessile and changed in color, where there were one larger and several smaller whitish projections from the anterior surface, now the whole surface is irregular, whitish with reddish tinge, as from minute blood-vessels. There seems no special change in the posterior surface of the growth. V. with + 2.00 D. = $\frac{1}{2}$. No change. Fundus normal.

"I have advised, in consideration of the continued growth, that on the whole it is best to have an operation, and if it is to be done, the sooner it is done the better."

I returned at once and found the patient's general condition much worse. She had lost flesh, had constant pain in the upper abdomen and took little nourishment.

August 1st, seven weeks after the date when the tumor was first noticed, I removed it under cocaine. The operation was attended with considerable difficulty. I wished to remove the growth with one cut of the scissors, if possible, as I feared that otherwise it might be obscured by hemorrhage and its extirpation then rendered more difficult.

The first attempt was to seize the tumor itself, but the tissue was so elastic that this was unsuccessful. Finally I was obliged to make a broad iridectomy, including not only the tumor but a generous piece of iris on either side. The iridectomy was carried back as far as possible, as in an operation for glaucoma.

The hemorrhage was insignificant. The subsequent healing was uneventful and after two weeks the patient was using her eye as usual. Her general condition, however, grew steadily worse and she died Sept. 16, 1905.

PATHOLOGICAL EXAMINATION.

(*From the Pathological Laboratory of the Mass. Charitable Eye and Ear Infirmary.*)

The specimen submitted for examination consists of a small piece of iris tissue containing a tumor 6mm, 2mm, 3mm in size. The tumor is white in color, firm, and its surface shows minute lobules. The specimen was fixed in formalin, but through a mistake was previously allowed to remain in water for about twenty minutes so that the fixation was imperfect.

On microscopic examination the tumor is found growing entirely within the stroma of the iris. The growth has no capsule and at its periphery is not sharply marked off from the normal tissue but irregularly infiltrates the latter. The lobulated appearance noted microscopically is no doubt due to an exaggeration of the normal markings of the iris. In

the main body of the growth the tumor cells are closely packed together, and all that remains of the iris stroma are its blood-vessels and a few strands of connective tissue radiating from them. Only a few pigmented stroma cells are to be seen. The pigment epithelium on the posterior surface of the iris is intact. Some of the sections show the sphincter pupillæ surrounded by tumor cells and partially invaded by them. The tumor shows no infiltration with inflammatory cells.

The tumor cells are large and fairly uniform in size. They are greatly swollen, due no doubt to the osmosis resulting from their exposure to water, and their cytoplasm is almost transparent, probably from the same cause. Owing to this transparency, the cell membranes are seen with great distinctness so that most often it appears as if the nuclei were situated in a network of reticulum. The nuclei all stain diffuse, owing no doubt to the solution of the chromatin by the water, but the nucleoli are well preserved. Occasionally the cells seem to be grouped about a lumen or to line a tissue space, but this is difficult to determine on account of the poor fixation. The cells can not be found growing over the surface of the iris in the form of columnar epithelium.

The most striking feature of the growth is the extraordinary abundance of mitotic figures. As many as twelve of these can usually be seen in a single field of the high-power dry lens, and they stand out with especial distinctness owing to the clear background afforded by the transparent cytoplasm.

PATHOLOGICAL DIAGNOSIS: METASTATIC CARCINOMA OF IRIS.

Remarks.—That the tumor is highly malignant is clearly indicated by the abundance of mitotic figures and also by its infiltrating character. Its exact nature is less easy to recognize from the histological examination, owing largely to the poor fixation, but yet can be determined within a high degree of probability. In the first place a sarcoma of the same size would be encapsulated, would not so extensively infiltrate the iris stroma, and would not display such an abundance of mitotic figures. More-

over, its stroma would be more abundant and would show a more definite arrangement. Granting that the tumor is a carcinoma, its metastatic origin is shown by the fact that it does not arise from the pigment layer, the only epithelium connected with the iris, and also by its infiltrating character. As a matter of fact, the clinical history, obtained later, leaves no doubt of the correctness of the diagnosis.

A CASE OF BILATERAL, SLOW, PAINLESS HYPERTROPHY OF THE LACHRYMAL, PAROTID, SUBMAXILLARY, AND SUBLINGUAL GLANDS, ACCCOMPANIED BY MARKED AND PROLONGED GENERAL SYMPTOMS.

BY DR. JOHN DUNN, RICHMOND, VA.

(*With two photographs on Text-Plate IV.*)

In June, 1903, Alberta, aged thirteen, a full-blooded negro girl, had parotitis which apparently subsided in a few days. About the middle of October "both upper eyelids began to swell"; five weeks later "the skin in front of both ears" did likewise. When first seen, Dec. 7, 1903, (*vid. photo, Fig. 1, Text-plate IV.*) the following conditions existed. Marked swelling of both upper eyelids and of both parotid regions. Palpation of the lids shows the swelling to be caused by excessively enlarged lachrymal glands, which extend above the ball two-thirds of the way to the inner canthus, the individual lobules of the gland feeling much like large shot; indeed, the whole gland seemed to the finger to be made up of a mass of buck-shot. Partial eversion of the lid showed the mucous membrane over the lower part of the gland to be excessively red, resembling raw beef. There was, however, no secretion from the gland, nor did any visible secretion of tears occur if the finger was rubbed over the conjunctiva. There was no congestion of the ocular or palpebral conjunctiva elsewhere than in the place above mentioned; no secretion of inflammatory mucus. The patient had no sensation of uncomfortable dryness about the eye or nose, and yet the conjunctiva was visibly dryer than normal. The lachrymals were in no sense painful, either subjectively or on manipulation.

The eyes feel more puffed in the morning than in the after-

ILLUSTRATING DR. DUNN'S ARTICLE ON "GLAND HYPERTROPHY."



FIG. 1.



FIG. 2.

noon, and at the former time feel "stickery." There was nothing else abnormal to be noted about the eye or ocular region. The parotids were likewise greatly enlarged in all parts and gave the same divided shot-like feel as the lachrymals. There was no secretion from them. Their ducts could be probed without producing the slightest output of saliva. The sublingual and submaxillary glands were in similar conditions. The patient was slightly annoyed by a "dry mouth," and was constantly thirsty. She suffered no pain from any of the swellings. Temperature, pulse, breathing normal. Proportion of white to red corpuscles 1-500, with simple anaemia. The only discomfort of which the patient complained was a pain in the stomach, a pain for which I could find no cause.

Being unable to get any suggestions as to treatment from any of the medical books at my command, I gave the girl 1 gr. of blue mass every two hours during the day until the first tendencies of salivation appeared, which happened in a few days. The glands grew slowly larger. I next gave the iodide of potash in gradually increasing doses, but without effect. The glands continued to grow. Arsenic was next tried; this, too, failed to produce any visible result. On January 6, 1904, the only changes visible were the considerable increase in the size of the swellings and the diminution in the weight of the patient. None of the glands were as yet painful to touch, or gave any evidences of fluctuation. The temperature remained normal.

There had within the last day or two appeared a patch of herpes in the upper lip just below the nose. The swellings were very much larger than on Dec. 7th; especially noteworthy was the increase in size of the submaxillary and sublingual glands.

Jan. 19, 1904, apparently no change since Jan. 6th. Blood examination made at this time was negative. Examination of the stomach contents revealed no cause for the "pains in the stomach." There was no ovarian tenderness; no demonstrable splenic or hepatic disease; no vaginal disease; no enlarged lymphatic glands. Iron, arsenic, mercury, potash, etc., were used in full doses and without effect on the progress of the swellings which continued to increase in size.

About June 1st patient disappeared and was not seen until July 21, 1904, when I looked her up to find that on June 2^d she had been taken with "weakness in the legs," and had not since been able to come to my office. At this time, July 21st, there was still further marked enlargement of all the glands, which were now enormous; the parotids were so swelling out their region as to greatly disfigure the face. There was no evidence of acute inflammation; no tenderness on pressure, or subjectively. Patient had temperature at 2 P.M. of 101° F. She complained of nothing but "weak spells in her legs" which kept her from walking.

July 20, 1905.—Patient remained in bed with fever for several months. Since then health has been continuously poor.

Status præsens: 11 A.M., 101° F. Patient can give no idea as to how long her fever has lasted, but there has been no time since she became ill in June, 1904, that she has felt free from fever. Skin shows epithelial disturbances over both parotid regions. At a little distance, skin looks glazed; examined more closely there seems to be a thickening of the dermis with raising of the epidermis; has headache at times; voice hoarse and weak. Patient is strong enough to come by street car two miles to office. Hypertrophy of all the salivary and lachrymal glands still present and very marked; the shot-like, separate feeling of the individual lobules, however, has largely given way to a "solid mass" sensation. The shotty feel of the lachrymals still persists. Nose has been "stopped up" for months—cartilaginous septum shows a thickened superficially ulcerative condition, highly suggestive in appearance of syphilitic infiltration of the septum. A thin mucous discharge flows from the nose. Hoarseness, which has existed for some weeks, is sub-glottic (as shown by mirror). Pharynx and naso-pharynx normal. Conjunctiva slightly congested along the cul-de-sac, is otherwise normal. Lymphatic glands of neck enlarged—epitrochlear enlarged. Inguinals enlarged. No splenetic enlargement. Patient has no enlargement of mammae. No epistaxis. Is much emaciated.

Sept. 19, 1906.—Patient has been seen at intervals of two or three weeks, or oftener, for the past year. The tem-

perature has been taken at each visit, and has always been found to be from a degree to two degrees above normal; her health until the past two weeks has been so poor as to suggest tuberculosis, and yet no evidence of this disease can be found anywhere, although the patient has been repeatedly examined. The extensive superficial ulceration of the septum has healed, and this without any intranasal applications. The inflammation of the skin which in July, 1905, was confined to the regions over the parotid has gradually extended until it meets over the bridge of the nose; its character is in all respects identical in appearance with that presented by the disturbance when it was more limited in extent. This skin eruption has been accompanied by no unpleasant subjective sensations.

On this date, Sept. 19, 1906, the patient looks better in health than at any time since her illness began, now over three years ago. On the face the line of demarcation between the diseased and healthy skin is clearly marked (*vid. photo, Fig. 2, Text-plate IV.*) and apparently the eruption is subsiding. Tongue is now moist and so is the conjunctiva.

Nov. 1, 1906.—On the face the skin eruption has disappeared as an active process. It has, however, left behind it atrophy of certain of the layers of the skin, the whole area of inflammation being clearly demarcated by a thin depressed scar with a more or less glazed surface. Patient is now free from fever and her general condition good. There remain no traces of the intranasal ulceration. There is no cough. There remains no enlargement of the cervical or inguinal-lymphatic glands. There is no visible hypertrophy of the lachrymal or parotid glands. The flesh over the parotids is abnormally flat as though the parotids had atrophied. In the submaxillary and sublingual glands there can still be felt a few hardened lobules.

In considering the above history two questions present themselves in front of a host of others. Are we dealing here with a case of chronic mumps, *i.e.*, an infectious disease of the salivary glands, or have we to do with a case of chronic systemic poisoning due to entrance into the circulation of substances which are normally excreted by

the lachrymal and salivary glands and pass thus out of the body? If the latter, then the case should be termed one of salivism and belongs to the same class of diseases as thyroidism, where it seems fairly well established that the exophthalmos, the cardiac, intestinal, cutaneous, febrile, and other symptoms are the result of entrance into the circulation of certain substances elaborated by the diseased thyroid gland, the cause of the disease being entirely unknown. Mumps is an infectious disease of limited duration; is manifested by swelling of the parotid glands, accompanied by pain and fever; from time to time the other salivary glands and laehrymals are also affected. Its effects upon the ovaries, testicles, and inner-ear structures are well known. In the case above reported, mumps affecting the parotids alone occurred early in June, 1903, and, according to the patient, every symptom disappeared within a few days after the disease set in.

About four months later the lachrymal, parotid, and other salivary glands began their *slow, painless*, and, at first, *afebrile* hypertrophy. The secretion through the salivary ducts ceased with the beginning of the hypertrophy and has never been re-established. Some months later the patient was taken down with a fever which lasted for over two years. The symptoms accompanying the fever were unlike those of any of the classified febrile diseases.

In connection with the fever there was "a weakness in legs." The patient became emaciated and lost appetite and physical strength to such an extent that for several weeks she was forced to keep to her bed, being unable to walk, and death seemed imminent. During this time I saw her once and found no symptoms of typhoid fever or malaria. Gradually her strength returned although for more than a year she could get about only with great difficulty. Medicines seemed in no way to affect the course of the disease.

Knowing how common syphilis is among the negroes of the South, mercury and potash were tried without effect. Arsenic and the usual tonics did not seem to in any way affect the fever or its accompanying symptoms. Save that a simple anaemia existed, examinations of the blood revealed nothing. There was no enlargement of the liver or spleen; no persistent diarrhoea. There was no demonstrable ovarian trouble. Menstruation, which normally occurs early in the negro race has not yet appeared. The background of the eyes was normal. Hearing normal. Brain clear. There was for a long time "a pain in the stomach" to the interpretation of which repeated examinations (including examination of the stomach contents) gave no clue. For some months in the third year there were hoarseness and a cough. The former was due to subglottic congestion, the congested area being clearly visible in the laryngoscopic mirror. The cough probably had the same origin, for the lungs remained normal. There was never any expectoration. Both hoarseness and cough have disappeared without treatment. There was never any abnormal enlargement of the faucial or post-nasal tonsils. There has never been one symptom distinctively tuberculous or syphilitic.

During the third year there appeared along with the cutaneous inflammation an ulcerative condition of the mucous membrane over the cartilaginous, and possibly also over a part of the bony septum, and some lymphatic enlargement. This ulceration and skin eruption disappeared without treatment; the former leaving no trace of its previous existence, the latter leaving an atrophy of the part of the skin affected. The disappearance of the symptoms of the disease kept pace with the lessening in the size of the hypertrophied glands. The indications are that the gland structure in the lachrymals, parotids, etc., has atrophied, being replaced by new-formed connective tissue.

These symptoms taken together seem to point to the

existence of a disease which is to be classed along with thyroidism, except that we have to do in the latter case with a ductless gland. We have here to do with a disease whose symptoms are not due to microbic action but to the effect upon the system of substances elaborated and returned to the circulation instead of being excreted by their proper channels. And I would suggest the term salivism as not inappropriate to describe the condition.

How far these views will eventually be found to hold good, I am unable to predict. I have had in my practice no similar case. A considerable number of cases of bilateral hypertrophy of the lachrymal and salivary glands have been reported since Mikulicz's article was written in 1892. To none of these reports have I access save two or three, and these are merely descriptive of conditions existing at the time the articles were written, not detailed descriptions of the general symptoms as they varied from month to month.

I found no drug which, so far as I was able to see, in any way influenced the course of the disease. The trouble occurs so infrequently that it will probably be a long time before an anti-serum produced from the salivary glands along the same lines as that produced from the thyroid by Drs. Beebe and Rogers, and used by them in the treatment of thyroidism, will be available for experimental purposes. And even then, until the cause is known, such an anti-serum would be of only limited value.

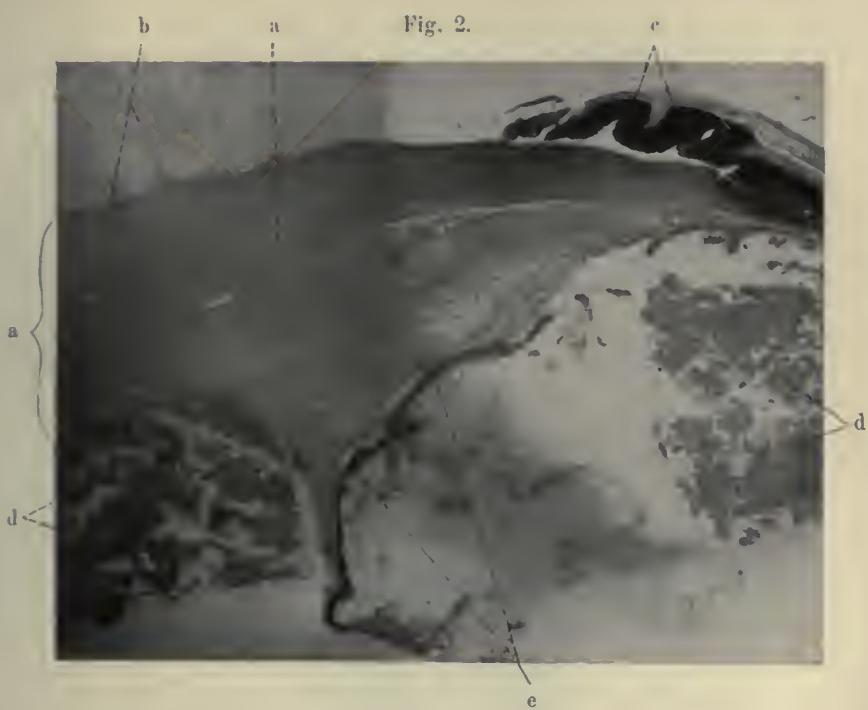


Fig. 1.



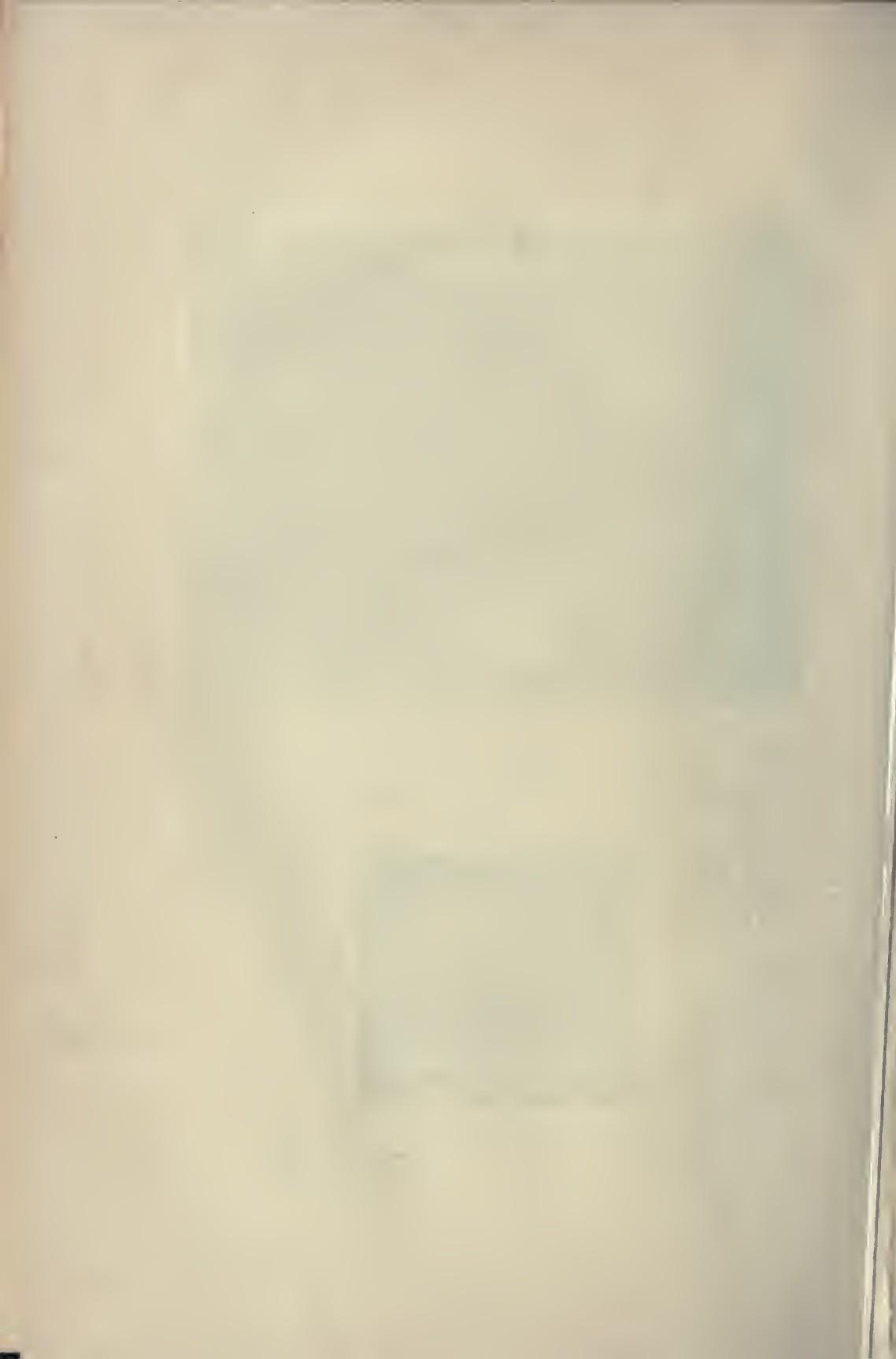
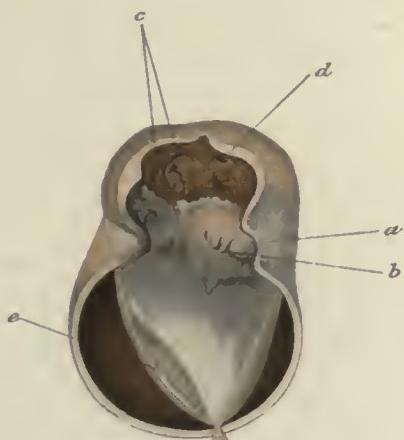
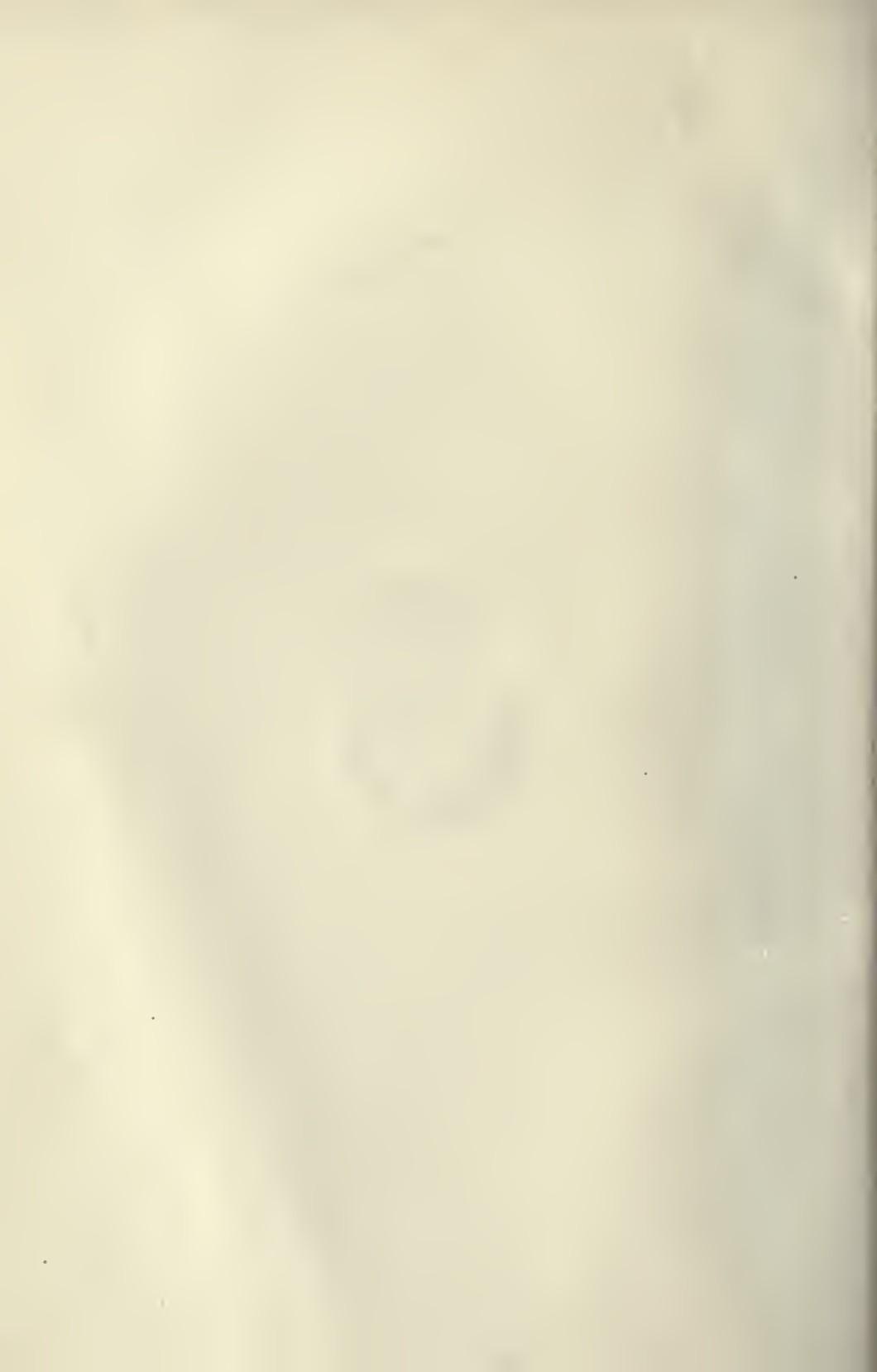


Fig. 2.





A CASE OF CONGENITAL STAPHYLOMA OF THE CORNEA.

BY DR. JOSEF RUNTE OF WÜRZBURG.

Translated from Vol. XLVIII. of the German Edition, July, 1903, by
Dr. MATTHIAS LANCKTON FOSTER.

(With three illustrations on appended Plates IX. and X.)

THE following case seems to be worthy of record because of its rarity:

An infant was found to have a staphyloma of the right cornea on the day of its birth, ulceration appeared three days later, and on the following day the eye was enucleated. Both parents were perfectly healthy, the labor had been not unusually long and without accident. Except for some conjunctivitis which was not blennorrhœal in character the left eye appeared to be perfectly normal.

The enucleated eye was fixed in formol and then hardened in alcohol.

Macroscopic Examination. — A fairly well marked furrow divided the eye into a posterior and an anterior portion. There were no pathological changes to be seen in the posterior part, but anteriorly the cornea had been replaced by a protruding, globular, whitish tissue. The measurements of the enucleated eyeball were:

Longitudinal diameter of the entire eye $22 \frac{1}{2}$ mm.

" " " scleral portion $14 \frac{1}{2}$ mm.

" " " staphylomatous portion 8 mm.

Transverse diameter of posterior portion 14 mm.

" " " anterior portion, 9 mm.

The posterior part of the staphyloma, through which

some pigment could be discerned, was thinner and less opaque than the anterior portion. Its top was thicker and more swollen than the periphery, was of a brownish white color, and had an uneven and ulcerated surface. The action of the alcohol on the eye had caused two dimples to appear in the staphylomatous portion.

The eyeball was then embedded in celloidin and divided horizontally.

No normal corneal tissue could be seen. The staphylomatous tissue was for the most part of irregular thickness, its posterior wall was uneven and covered with pigment, which varied in color from yellowish brown to brownish black, part of it spread out with a fair degree of regularity, part in irregular strips. Nothing beside this pigment could be seen of the iris. The lens was of normal size, luxated forward and laterally so as to lie near the ciliary body, which exhibited some collections of pigment. The ciliary processes were pretty well developed on one side, were long and reached somewhat obliquely forward in the form of little ledges, but on the opposite side they were short and small. The ciliary muscle could not be seen. The sclera was slightly thinned at the place where the lens lay and in front of it in the neighborhood of the ciliary body, and a little thickened at the corresponding place on the opposite side, but elsewhere it was of normal thickness. Nothing pathological could be seen in the choroid, which lay smoothly on the sclera, nor in the retina which had been artificially detached. The stump of the optic nerve and the papilla presented the usual appearances.

Microscopical Examination.—The entire staphyloma was very irregular. The thickness of its wall varied from $1/4$ to 1 mm . The anterior corneal epithelium was present only in places on the periphery where it lay on cicatricial tissue which ran in more or less wavy lines on the anterior surface. Its stratification was normal, but it was thickened in places and somewhat infiltrated

with leucocytes. It also contained peculiar cells, especially in its middle and anterior portions, part of them with round, part with oval, part with elongated nuclei lying for the most part excentrically, each surrounded by a bright space. All the various stages of karyokinesis could be demonstrated in the preparations stained with haematoxylin, a proof that the epithelium was undergoing proliferation. All that was left of the true corneal tissue appeared as a superficial layer 3 or 4 mm in diameter about in the middle of the staphyloma. Beneath it was a firm, thick layer of coagulated fibrin pus cells which extended into the deepest layers of the staphyloma. The substantia propria was everywhere replaced by a cicatricial tissue permeated with lymphocytes. The posterior part of the cicatricial tissue was composed of numerous firm, thick connective-tissue fibres which were stained dark red in the preparations treated by Van Giesen's method, while anteriorly the connective-tissue fibres were stained bright red, but they showed marked cellular infiltration. Numerous vessels distended with blood were cut across in the tissue of the staphyloma and there were extravasations of blood between the connective-tissue fibres. No trace remained of either Bowman's or Descemet's membrane. Large portions of staphylomatous tissue protruded from its posterior wall into the posterior chamber.

In the peripheral sections was a rather large oval cyst in the midst of the staphylomatous tissue, the position of which could be recognized macroscopically as a circumscribed thickening of the cornea. By a study of the series of sections it was shown that this cyst must have been caused by a partial involution of the staphyloma and the healing over subsequently of the superficial part of the degenerated tissue. It was lined with laminated pavement epithelium which had the same structure as the remains of the anterior corneal epithelium and presented karyokinetic figures in various stages. The

posterior surface of the staphyloma was covered with pigment, completely in the peripheral sections, to a great extent in the central, but in the region corresponding to the pupil it was absent or very sparse. There were little pigment granules in the anterior layers which must have wandered there from the posterior wall. On the posterior wall was a space bordered by pigment, continuous through many slides, filled with leucocytes, which may have formed the space by their interposition between the layers of iris pigment.

No traces were to be found of Fontana's space or Schlemm's canal. The space which corresponded to the posterior chamber was filled with coagulated fibrin and leucocytes, with numerous pus cells, especially in the hollows between the above-mentioned projections from the posterior wall and in the space between the ciliary body and the staphyloma. The spaces between the ciliary processes were also filled with leucocytes. The short ciliary processes on one side were directed forward. The fibres of the zonula could be seen plainly as small threads broken from the lens and reaching into the posterior chamber on the side opposite that to which the lens was luxated. Between them were many leucocytes. The ciliary muscle on each side was poorly developed.

The shape of the lens varied on the different slides, but the change in form from the normal was probably due to the action of the formol. The lens capsule was normal, except for a wavy outline. Upon it were many leucocytes. The anterior lenticular epithelium was normal. Between the lens fibres were spaces of various sizes filled with fluid. Some of the fibres were opaque and swollen, others changed to vesicular cells. The centre of the lens was occupied by the detritus of lens fibres. The vitreous was shrunken and fibrous with a few leucocytes about its periphery. There were no pathological changes in the choroid, pigment epithelium, or retina. The layer of rods and cones was in good condition. The papilla

had no glaucomatous excavation, the central vessels were well filled with blood, and the tissue of the nerve was normal.

Krückow in his article on "Two cases of congenital staphyloma of the cornea" collated the literature on the subject and was able to find only a very doubtful case reported by Beér, a mention by Schön of a proposed article by von Ammon, a case of Sichel's, and Crampton's report of two brothers each apparently born with a staphyloma of the left eye. Since that time several cases have been observed, the records of which can be found by reference to the appended bibliography.

It must be acknowledged to be proven that intra-uterine inflammation occurs. Hippel refers many anomalies of the eye to this cause, among them total staphyloma of the cornea. It is also fairly certain that the inflammation is of a bacterial nature, because the presence of bacteria has been demonstrated in a few cases of congenital ocular inflammation. Probably they caused the inflammation in this case although their presence could not be demonstrated in spite of the use of various methods of staining. But it is hard to tell how they excite the inflammation. It is well known that the exciters of inflammation may be introduced into tissues either endogenously, through the blood, or ectogenously, through external influences. According to the investigations of Leber and Schöbl, the cornea of the embryo contains blood-vessels at no time during its development, so it is difficult to understand how it can be primarily infected through the blood. At the same time there is nothing upon which we can base a theory of external infection, and yet we have to consider the corneal affection as primary. There is likewise nothing to indicate the time when the infection can have taken place.

EXPLANATION OF THE PLATES.

FIG. 1.—Plate IX. Lateral view of the eyeball.

FIG. 2.—Plate X. Horizontal section of the eyeball.

- (a) lens luxated laterally.
- (b) pigment on the lens.
- (c) pigment on the posterior wall of the cornea.
- (d) cicatricial tissue in the cornea.
- (e) retina.

FIG. 2.—Plate IX. Microscopic section through the staphyloma.

- (a) cicatricial tissue.
- (b) vessels in the cicatricial tissue.
- (c) coating of pus.
- (d) leucocytes.
- (e) remains of the iris.

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REPORT OF MEETINGS OF THE OPHTHALMOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE.

By DR. H. H. TYSON, SECRETARY PRO TEM.

OCTOBER 15, 1906. PRESIDENT, DR. WILBUR B. MARPLE, IN THE CHAIR.

On account of the absence of Dr. LAMBERT his case was presented by Dr. CLAIBORNE.

It was a case of high myopia, shown at the previous meeting, which had been operated upon with excellent results. The patient had vision $\frac{1}{20}$ before operation and $\frac{1}{10}$ after operation, with correcting lenses; one eye requiring a weak convex cylinder and the other a weak convex sphero-cylinder.

Discussion

Dr. W. B. MARPLE stated that he had operated upon a case of high myopia, 18 D., with sclerosed lenses. He made a preliminary iridectomy and subsequent discussion in one eye, resulting in vision $\frac{1}{20}$ and reading J. 1, but notwithstanding that fact the patient continued to use his myopic eye for reading.

Dr. DENIG stated that he had operated upon twelve cases during the past eight years; but he operated only upon those cases with no changes in fundus.

Dr. BARNES said that he had operated upon nine cases and always made an iridectomy. He does not consider the operation safe without it.

Dr. V. C. PEDERSON exhibited a new gas ether inhaler. A description of it is to be published in full in the *Annals of Surgery*.

Dr. J. H. CLAIBORNE presented a specimen showing a piece of a percussion cap in the globe. The case was one in which

the tentative diagnosis was erroneous on account of the misleading history given by the patient.

About ten days later, when the true history of the injury to eye was obtained, a correct diagnosis was made and confirmed by a skiagraph, and the eye was enucleated. Upon section and examination the foreign body was found as indicated by the X-ray.

Dr. E. B. COBURN showed skiagraph of Dr. Claiborne's case, taken after enucleation.

Dr. KIPP said that it was generally supposed that copper or brass in an eye was more dangerous than other metals, but he did not think that this was necessarily so. He had a case still under observation in which a piece of a percussion cap had been imbedded in the retina for thirty-six years without apparent bad results.

Dr. E. GRUENING referred to a case in which a piece of copper had passed in and out of an eye with no worse result than if it had been any other metal.

Dr. DENIG described a case in which a piece of percussion cap passed through the sclera and lodged in the retina, remained there for four months, finally migrated and disappeared. It had remained in all five years without ill result.

Dr. DIXON stated that he had found that foreign bodies in eyes which were hardened after removal were sometimes displaced by the exudates contracting during freezing, but when they were fixed foreign bodies the measurements taken by the skiagraph chart remained true. He considered skiagraphing after enucleation as unnecessary and a waste of time.

Dr. W. B. MARPLE presented a specimen of sarcoma of the choroid. The case was one in which the tumor contained very little pigment, and which by transillumination with the Sachs illuminator showed no difference in the illumination, but, with a weaker light (Leber illuminator), it showed pupil in shadow, proving the necessity of using weak illumination in testing for tumors possessing small amount of pigment.

Dr. E. GRUENING gave some very interesting personal observations on ophthalmic hospitals and ophthalmic work

in Europe, made during his recent tour of Germany, Switzerland, and France.

Dr. FRANK J. PARKER read a paper: **The eye symptoms of trichinosis.**

Following is the author's abstract:

Packard in 1897, in reporting a case of trichinosis, spoke of the marked œdema of the eyelids, which subsided in four days. Oliver the same year reported the eye examination of a case which showed marked hyperphoria for near and far and a small striated hemorrhage overlying the inferior temporal vein in the left eye. Osler reported five cases in which there was œdema of the eyelids, and he regards this as an important symptom. Six cases were reported that were in the Presbyterian Hospital in the winter and spring of 1906, four of which sought professional aid on account of the eyes; in these six cases, all had collateral œdema and in four it was associated with conjunctival hyperæmia; four had tenderness of the globe and pain on rotation; one had subconjunctival ecchymosis; one case showed diplopia as the earliest symptom. One case had acute nephritis with neuroretinitis and hemorrhages. Various explanations have been given for the œdema, such as blocking of the lymphatics by the parasites, pressure upon the blood-vessels, and that the œdema is an attendant feature of the myositis and is most noticeable about the eyelids where serous effusions most readily occur. The trichinæ in the encysted condition remain alive and capable of development for many years, subsequent invasions producing more severe symptoms. Failure to find the trichinæ in the muscle sections should not mean a negative diagnosis, as a case may present the characteristic clinical picture before the trichinæ have developed in sufficient numbers to be easily discovered.

The important points in diagnosis are:

Fever resembling typhoid.

Leukocytosis ranging from ten to twenty thousand.

Eosinophilia from ten to seventy per cent.

Œdema of the eyelids, tenderness of the globe, and painful rotation.

Finding the trichinæ or the inflammatory areas between the muscle fibres.

DECEMBER 17, 1906. REPORTED BY DR. H. W. WOOTTON,
SECRETARY.

Dr. J. H. CLAIBORNE was elected Chairman and Dr. H. W. WOOTTON re-elected Secretary for the ensuing year.

Dr. GEORGE H. BELL presented a case in which there had been a double perforation of the globe by a piece of steel, from Dr. Skeel's clinic. A radiograph of the case was shown and normal vision had been preserved. The patient was first seen June 29, 1906; he was a blacksmith, and while working on a piece of steel a fragment chipped off the face of his hammer and flew into his eye. There was a large wound near the limbus on the temporal side. The eye was very soft and filled with blood. V-0. An X-ray picture was taken by Dr. G. S. Dixon and showed that the piece had lodged well back in the orbit; size, 5.5mm x 6mm. An iridectomy was not attempted owing to the soft condition of the globe and the nature of the wound, as any manipulation would result in the loss of considerable vitreous. The patient was put to bed, atropin was instilled, and an uneventful recovery took place. At present there are some opacities in the periphery of the lens which have not increased any in the last three months. V- $\frac{1}{2}$ with correction. Dr. Bell was unable to locate the rent in the retina through which the steel passed. Instead of attempting to remove the steel from the orbit, Dr. Bell thought that it was too deeply imbedded and he preferred to let well enough alone. He thought the good result in the case was due to two facts: 1. Localization of the foreign body by means of the X-ray. 2. There had been no manipulation of the eye whatsoever; not even a speculum had been employed.

Dr. E. B. COBURN presented a Paquelin cautery which he had modified for eyework. It consisted of a brass tube, fitted at one end with a nipple for attaching the usual double bulbs for supplying a stream of air, and at the other end was connected by a bone plug to a platinum point such as is ordinarily supplied with pyrographic outfits. The bone plug referred to was employed on account of its being a non-conductor of heat. The cavity of the brass tube, or handle, is filled with wicking or asbestos, which is to be saturated

with benzine. A small mica shield protects the patient from the hot gas that escapes from the vent in the point. The instrument weighs less than an ounce and with the point is only about $5\frac{1}{2}$ inches long; it is safe, portable, and inexpensive, and is not intended to supplant the galvano-cautery. Dr. Coburn stated he had found it useful for corneal ulcers, in conical cornea, and for the destruction of new growths.

Dr. J. H. CLAIBORNE presented a chart illustrating the axis of astigmatism.

The scheme was based on the positions of the axis of cylinders as they occur according to the trial frame, and upon the examination of 1176 cases of astigmatism.

In the scheme the arc of hyperopic astigmatism is an arc of 90 degrees.

Axes of preference: 90° , 75° , 45° , 105° , 135° .

Secondary axes 60° , 120° .

The arc of myopic astigmatism is an arc of 30 degrees.

Axes of preference: 180° , 15° , 165° .

Secondary axes 10° , 170° (highly exceptional).

There are two neutral axes, right and left, of 30° each; each is invaded by the convex and concave cylinders; called right and left, from their positions as one looks at the trial frame.

Right arc of neutrality:

Axes of preference: 30° , 20° .

Left arc of neutrality—sole axis 150° .

Convex cylinders occupy the axis 180° in 4%.

Concave cylinders occupy the axis 90° in 1.89%.

In conclusion, Dr. Claiborne deduced the following laws:

Law 1st: The angles formed by the axis of astigmatism are measured in arcs of a circle.

Law 2d: The law of multiples governs the magnitudes of these angles and arcs.

Law 3d: The arc of 15° is the common factor of arcs, and the angles vary in multiples of this number.

A further description of Dr. Claiborne's chart and his deductions will be found in the *Journal of the American Medical Association*, February 4, 1905.

Dr. H. H. TYSON presented a case of sarcoma of the iris of the right eye.

The growth first made its appearance about one year ago, since which time it has slowly but gradually increased in size until at present it is about 30% larger than when first noticed. The tumor was flesh-colored with a small pigment spot on the outer edge, with capillaries running over it, occupying the upper part of the iris, extending from the pupillary edges to the ciliary border, while on the posterior aspect the proliferation of pigment extended almost to the horizontal meridian. Vision normal. Clinically a diagnosis of primary sarcoma of the iris was made and concurred in by a number of ophthalmologists. Enucleation was advised, to which consent has been obtained. A histological report will be presented later.

Dr. H. H. Tyson reported a case of **double perforation of the globe** from a No. 7 gun-shot, with preservation of vision.

Dr. Tyson exhibited a radiographic chart of the case made by Dr. Geo. S. Dixon. The patient was a young man, aged twenty-two years, who, while hunting with friends, was accidentally shot in his face, four shot lodging therein, one in his forehead, over left eye, one in the left side of his nose, one in left cheek just below the malar process, and one passed through the left eye. It entered the outer side below the horizontal plane, passing inward, backward, and downward and through it, lodging in the orbit near the sclera. According to the chart, it was $3 \times 3\text{mm}$ in size, and its centre was 21.25mm back of the centre of cornea, 7.75mm below horizontal plane, and 10.5mm on nasal side of vertical plane. Upon the first examination, Nov. 7th, the eye was inflamed, had hyphaemia, hemorrhages in vitreous, and the fundus was so hazy that the optic disk was barely visible. Vision $\frac{1}{100}$. Absolute rest in bed was advised, with kali iodid. internally. His vision gradually but steadily improved until at the examination on December 3d it was $\frac{1}{2}$. The media had cleared so that the details of the fundus were plainly visible, and the aperture made by the exit of the shot from the globe was distinctly observed, with flame-shaped hemorrhages radiating therefrom. The wound of entrance was observed well forward just behind the ciliary processes, with two string-like floating opacities attached thereto. The eyeball was perfectly white and free from all irritation, and he returned to

his work as a watchmaker. The iodide was continued in the hope of absorbing the remaining opacities and thereby still further improving the vision.

Dr. J. WOLFF presented a case of **Parinaud's conjunctivitis**.

The patient was a girl of twelve years of age. For past four weeks noticed slight ptosis of left upper lid and a moderate stringy muco-purulent secretion.

The conjunctiva of the tarsus and upper fornix shows a number of papillomatous excrescences varying in size from that of a trachoma granule to half a centimetre. In places they are confluent. The largest of them has an overhanging edge and is ulcerated on the surface. The preauricular gland on the left side is very much enlarged and tender. There are only two or three small excrescences on the conjunctiva of the lower lid.

Dr. MARTIN COHEN read the history of a case of **amaurotic family idiocy**.

When the patient was eight months old, a diagnosis was made of amaurotic family idiocy by Dr. I. Goldstein of this city. The patient was a female of Hebrew parentage. There had been no idiocy in the family, four older children being alive and healthy.

When the infant was five months old the mother noticed that it was not thriving as had the older children at the same age, that the head was not held erect, and that little notice was taken of the surroundings.

Physical examination when the patient was eight months of age showed the following: The child was stout but flabby. The skin and mucous membranes were pale. Though the behavior was dull and lethargic, occasionally there were sudden spasmodic movements of the trunk and extremities. The muscles were flaccid, and the head and back were poorly supported. From this time on, the general condition deteriorated, and the child grew progressively weaker and paler. At seventeen months a broncho-pneumonia developed. The child was apparently blind; the pupils were widely dilated and irresponsive to light. Ophthalmoscopic examination showed in the macular region of both fundi a pearly gray oval patch with the long diameter vertical, nearly twice the size of the disk. In the centre of this area was a sharply

defined oval spot of a cherry red color about one sixth the diameter of the patch itself. Both disks had the appearance of a well marked gray atrophy. Otherwise there were no pathological changes. One week later the patient died. The pathological report of the examination of the eyes by Dr. Dixon follows:

The eyes were measured immediately after removal. The vertical diameter was 21mm, transverse 21.5mm, antero-posterior 21mm. The clear cornea measured 12mm vertically by 12.5 laterally. Nothing unusual about the external appearance of the globes. The cornea, iris, ciliary body, lens, and choroid were normal. One eye had been hardened in formalin, the other in Orth's fluid. The retina of the eye hardened in formalin appeared shrunken and thin, the other appeared more nearly in its natural condition. In the latter its thickness 3mm to the nasal side of the disk was 236.6 μ . The macula differed in thickness on the two sides of the fovea. Its greatest elevation was 425.6 μ from the ends of the cones. The temporal side was 303.6 μ . The fovea was flat and broad, measuring 239.4 μ laterally. The margin arose abruptly instead of in the usual gradual manner. The depth of the floor of the fovea below the macular fold was 178.2 μ .

True oedema was not noted, though there was present the usual spacing out of the external reticular layer a short distance on each side of the macula, which has been repeatedly reported in these cases. Muller's fibres did not appear in their usual form but as a conglomerate mass not easily distinguished. The multipolar ganglion cells were present in about their usual number outside the macula, but gave the impression of being swollen; were round in form. Giant ganglion cells were occasionally seen. The nuclei and the nucleoli were generally displaced to the side. In a few spaces the cells apparently remained. In the remaining cells reticular network was usually massed about the nucleus, being more or less scanty toward the periphery of the cell. Weigert's stain showed some dark granules in the cell protoplasm described by other observers. It also showed in the amacrine and bipolars. Dendritic processes of the multipolars were occasionally seen. There was no degeneration of the rods nor cones, and no changes in the other layers already mentioned. The optic

nerve was in the beginning of simple atrophy. Dr. Dixon stated that the consensus of opinion concerning the disease was that it was one of degeneration of the ganglion cells of the entire nervous system and that the changes in the retina and optic nerve were simply the ocular manifestations of a general disease. A complete autopsy on the case reported was unfortunately not obtained.

Discussion.

Dr. J. W. WEEKS thought that in Dr. Tyson's case tuberculin might be employed to establish a diagnosis, although the case did not have the appearance of tubercle, which should be grayer in color with lymph on the surface of the iris. This tumor was "cleaner" than either the tubercular or syphilitic tumor would be expected to be.

Dr. E. GRUENING thought that leuco-sarcoma was the correct diagnosis.

In this Dr. W. B. MARPLE agreed.

Dr. CLAIBORNE in the discussion of Dr. Cohen's case stated that he had seen the disease associated with general tuberculosis. Amaurotic family idiocy should no longer be regarded as peculiar to the Hebrew race. It did not always occur in members of the same family and the term "infantile" should be added.

Dr. SARIL thought that Dr. Wolff's case was certainly one of Parinaud's disease. Antiseptics and excision of masses were indicated.

Dr. CLAIBORNE also considered the case one of Parinaud's conjunctivitis, and stated that in his opinion the preauricular gland with the nodules in the conjunctiva was characteristic.

Dr. JOHN E. WEEKS presented a specimen of **non-pigmented tumor of the choroid** which involved the ciliary body and root of the iris in the lower outer portion. The cells of the growth were contained in irregular alveoli the walls of which were very thin and were composed of connective-tissue cells. About two thirds of the cell mass was made up of the ordinary sarcoma cells. The remaining third was made up of large, irregularly spherical cells possessing one or more oval nuclei with nucleoli. Although varying somewhat in size, they are

fairly uniform. The large cells are present in all parts of the growth.

The large cells apparently spring from the endothelium of the lymph-channels and blood-vessels, giving the growth the character of endothelioma.

Dr. C. W. CUTLER read a paper entitled **Relation between diseases of the eye and diseases of the nose.**

The following is an abstract of the paper:

The writer confined his attention to the association claimed by certain writers to exist between inflammation of the nose and especially of the sinuses, not necessarily purulent, and certain intraocular inflammations, such as uveitis, the cause of which is often obscure. The question is by no means a simple one, for mere coincidence of nose and eye trouble does not prove a causal relation.

In the writer's experience, such an association has not existed, although during the past years it has been his custom to have a thorough examination of the nose made in cases of uveitis, glaucoma, and detachment of the retina, in which the cause was obscure.

In most cases of detachment and of acute uveitis, frontal pain or nasal conditions were not prominent symptoms; but in two cases of the latter disease which yielded promptly to sodium salicylate, hot compresses, and atropin, the nasal conditions, or possibly the condition of the sinuses, which may have been a contributory cause, would have been favorably influenced by the treatment; and it is not fair to exclude this association until we know more of the relationship than we do at present. And it is important that specialists familiar with the technic of nasal and sinus conditions should be consulted in all doubtful cases.

The writer referred to contributions made by Winckler, Ziem, Kuhnt, and Posey, who have written about the anatomical relations of the orbit to the nose and sinuses.

Winckler, after describing the normal relations of veins and lymphatics, mentions certain anomalies, of which there are many, and says, in any case where disease of the eye certainly depends on nasal obstruction, there must be abnormal relations, otherwise the latter would be followed much more often by ocular disease.

Hyperæmia of the optic nerve is a frequent result, according to Kuhnt, of both acute and chronic processes, and is more apt to be congestive than inflammatory. This passive hyperæmia is an important predisposing influence for the different forms of intraocular inflammation. Many cases of the most diverse nature have been reported, but in proportion to the frequency of nasal and sinus disease, those with inflammation and with organic changes must still be regarded as exceptional, and due, as Winckler has said, to exceptional conditions.

Many cases may of course be classed as mere coincidences and others are classed as functional, having as a basis the nervous temperament, which makes one person suffer intensely from a fault or error which others endure with little or no discomfort.

Unpublished papers of Dr. Haskell of Boston were quoted at length. In one class, 65 cases were observed: "Headache was the most constant symptom, occurring at night or on wakening, and relieved by a change of position or any measure which lessened the congestion in the nose."

"Asthenopia and pain, independently of the use of the eyes, was frequent; a striking symptom was present in a number of cases—a feeling of confusion and helplessness in attempting any mental exertion, increased by use of the eyes, but not dependent on it."

A symptom pointing to the nose and on which Dr. Haskell lays stress, is a variable error of refraction which made it necessary to change glasses frequently, while after relief of the nasal condition, the refraction became stable, the astigmatism tended to become more symmetrical, and the glasses were worn with comfort.

Of the 65 observed, 8 per cent. were reported normal, 92 per cent. were faulty as to the nose; some form of pressure contact was found in 85 per cent. of all cases; 38 were operated upon, and among these there was no relief in 3 cases, partial relief in 19 cases, entire relief in 16 cases.

Of course it is important to determine, with as little loss of time as possible and the utmost consideration for the attending practitioner and for the patient, the relative importance in a given case of the nose and its adnexa on the one

hand, and of the eyes on the other hand, in the etiology of certain kinds of headache and ocular discomfort.

It is not possible to formulate rules which will have a general application, but the trained observer becomes skilled in determining which factor to attack first.

In the discussion which followed, Dr. WILLIAM C. POSEY of Philadelphia made the following statements:

If the skull is submitted to a series of cross-sections which expose the air spaces connected with the nose, and its neighboring structures, it is easy to comprehend why inflammatory conditions in these spaces should excite ocular symptoms. Contiguity of tissue alone is cause enough to occasion them, but when one views the enormous extent of the mucous membrane which is spread out upon the walls of the sinuses and of the nose itself, and considers the numerous and intimate connections which this mass of loose vascular tissue has with the orbit and its contents, it is difficult to understand how an inflammation of any degree of severity could arise in a sinus without provoking changes in the eye and its adnexa. And, as a matter of fact, although the eye is in a measure protected, by certain peculiarities of structure, from participating in these inflammatory conditions, ocular manifestations are not infrequently occasioned by them, and these occur in so striking and significant a manner that the diagnosis of the intranasal condition may often be suspected by the ocular signs alone.

Although cases which present ocular symptoms which are originated by nasal disease are not rare, in Dr. Posey's opinion they are frequently overlooked, the etiology of the ocular affection being attributed to other conditions. This is accounted for chiefly by the sinusitis escaping detection, for the diagnosis of this condition is not easy, and repeated examinations by an expert rhinologist are often necessary before the inflammation in the sinus is discovered. It happens too often that the possibility of an ocular inflammation having originated in a sinusitis is dismissed by the patient's declaration that he "has never had any trouble with his nose." There is ample proof that a mere congestion of the sinus, without the presence of exudate, is sufficient to excite marked ocular symptoms.

He said that he had seen other cases of moderate inflammation of the optic nerve complicating ethmoiditis and sphenoiditis which had been occasioned by bathing in cold salt water. In this class of cases the nerve, although protected from the sinus by its sheath and by the double layer of periosteum which covers the bone forming the barrier between the nerve and the sinus, becomes affected by contiguity of tissue, the inflammation varying in intensity from a simple oedema to an active retrobulbar inflammation. Moderate degrees of neuritis present but slight ophthalmoscopic signs, but may frequently be diagnosed by the distension of the lymph sheaths of the retinal vessels, and objectively by a diminution in the light sense, which may be conveniently tested by Bjerrum type. In this class of cases, there is often a feeling of fulness in the eye, with some pain on rotation and attempts at pushing the globe back into the orbit, the symptomatology, in fine, of cases of so-called "optic neuritis from rheumatism."

Indeed it is probable that if more cases of this type were subjected to a careful rhinological examination, a sinusitis would be found to be the underlying cause in many. The writer has not been able to convince himself of the changes in the field of vision which occur in cases of sinusitis without ophthalmoscopic signs, which Ziem and Kuhnt attributed to a nasal condition, and suspicions that the contraction and scotomata which were observed by these authors were due to neurasthenia or intercurrent causes. Naturally, scotoma and limitation of the field are to be expected where there is ophthalmoscopic evidence of neuritis.

Dr. Posey desired to emphasize the frequency with which oedema of the lids is encountered even in beginning cases of sinusitis. The puffiness is usually most marked in the upper lid and particularly on the nasal side, though the entire lid may be swollen. This oedema is to be distinguished from the inflammatory swelling and thickness of the lid which results from cellulitis, as it is entirely non-inflammatory in origin, as well as in appearance, and also from the ptosis which is at times present as a result of a palsy of the levator of the lid. The swelling is usually most marked in the morning and disappears during the day, but it is also apt to be brought on by bending the

head forward. Like all other ocular symptoms of sinusitis, the cedema may disappear for a time, with the discharge of secretion from the sinus, but reappears when the fluid reaccumulates and the congestion of the mucous membrane becomes greater.

That affections of the muscles of the eye are not infrequently the result of sinusitis is occasioned by the juxtaposition of some of them, like the internal and superior rectus, to the walls of the orbit, and by the very close association of the motor nerves supplying the muscles with the sphenoid cavity, as they pass along the outer wall of the sinus. Marked muscular insufficiencies not infrequently arise in this class of cases, hyperphoria and exophoria of varying degrees being the conditions generally originated by them, hyperphoria, of course, being induced by a swelling in the floor or the roof of the orbit, exophoria by some disturbance in the inner wall.

Dr. Posey referred to another class of cases which may be excited by a sinusitis and which are of great interest to the ophthalmologist, namely, those designated as "prelachrymal abscesses," the writer referring by this term to the swelling which forms at times above the internal palpebral ligament, and somewhat external to the lachrymal sac.

Though the differential diagnosis in these cases of prelachrymal abscesses is usually comparatively simple, at times the pus gravitates behind the sac in such a way that the exit to it is closed, and an ectasia of the sac itself occurs, with all the signs of true lachrymal abscess. Incision by means of the Bowman procedure does not, however, liberate any pus, the purulent matter escaping only after the probe is withdrawn and passed horizontally into the cells forming the inner orbital wall.

In conclusion, Dr. Posey said that while there may be a tendency upon the part of some to exaggerate the connection of ocular conditions with sinusitis, and while there is the temptation for all to discover causes which they are interested in finding, in agencies which may not be implicated in any way with the disease within the eye, careful rhinological examinations should be made in all suspected cases, and the possibility of the ocular affection being

occasioned by the nasal only dismissed when repeated examinations have failed to discover any disease within the cells.

In the discussion which followed Dr. C. G. COAKLEY stated that in acute sinus disease many patients complained of eye symptoms such as pain on rotation and on using the eyes; with the relief of the sinusitis the eye symptoms disappeared. Cases of chronic sinusitis for the most part gave no eye symptoms and when the patient had headache the question became one of operation. In cases of headache without discharge various conditions of the nose were found, but headache was not relieved by relieving these conditions; general causes for the headache should be sought before operation for the sinus trouble was attempted.

Dr. E. GRUENING stated that superficial ocular complaints due to various conditions of the nose were not infrequent, particularly lachrymation on exposure to cold.

Many of these cases were due to spurs of the septum, etc. The deeper affections of the eye were not caused by nose or sinus condition so far as he has been able to observe, except of course orbital cellulitis as is well known.

Dr. W. K. SIMPSON stated that between diseases of the nose and diseases of the eye there were two types of relation: the immediate and the remote; the former was due to abscess and sinus trouble, the destructive forms of syphilis, and marked nasal deformities. In all these, of course, the continuity of tissue made the relationship evident and easy to understand. The remote relation was a more reflex type and this relationship was more difficult to comprehend.

In the majority of acute cases of nasal and sinus disease, it was to be remembered that absolutely no eye symptoms were present.

Dr. COFFIN called attention to the fact that operation upon the nose was never followed by disease of the eye.

Dr. LINN EMERSON thought that eye symptoms were in very rare cases due to nasal affections, and the treatment of the sinuses and the nose cured these cases.

Dr. R. DENIG read a paper entitled **Some remarks on the operation for secondary cataract embedded in the vitreous.** This article appears in full in the January number of the *Ophthalmological Record*.

REPORT OF THE OCTOBER (1906) MEETING OF THE WILLS' HOSPITAL OPHTHALMIC SOCIETY, PHILADELPHIA.

A meeting of the Wills' Hospital Ophthalmic Society was held at the hospital on the twenty-second of October, 1906. Dr. S. LEWIS ZIEGLER presiding.

Dr. FRANK FISHER reported a case of **bulous keratitis** in which, after having tried various forms of treatment, he believed that it would be best to perform an iridectomy, although his experience in the past was against the procedure. Dr. CHARLES A. OLIVER favored the operation, basing his feelings in regard to the procedure upon the good results which had been obtained by him in somewhat similar conditions. Dr. ZIEGLER thought that attention to the tear passages with a subsequent iridectomy would be the best line of therapy. Dr. HAROLD G. GOLDBERG stated that in his hands dionin in five per cent. strength solution had been of value in some cases which had come under his observation: Dr. Oliver said that this had also been his experience.

Dr. FISHER exhibited an interesting case of **traumatism** from a fragment of tool or coal which had been inflicted two weeks previously. The foreign mass had torn through the lower outer corneal edge and ciliary region of the right eye. There was a localized opacity of the crystalline lens and adjacent capsule in the wounded area. Intraocular tension was normal. The case being a new one in the hospital, it was the consensus of opinion of those present that the X-ray should be immediately used and attempts made, if possible, to remove the foreign mass, do an iridectomy, and remove the lens; the case to be reported upon at the next stated meeting.

Dr. OLIVER exhibited a curious type of traumatism in

which the corneo-scleral limbus and the underlying iris had sustained a clean-cut incision from a large piece of steel that had not penetrated any farther into the eyeball. The two flaps of the wound were situated upon different planes and levels. The anterior chamber was closed. There was no reaction. The wound healed. Radiographs failed to show the presence of any foreign body in or around the eye, and the patient recovered with the restoration of the parts to their normal position with a scar which was only visible by strong concentration of light and high magnification. There was full vision and large uninterrupted fields. Treatment had been limited to the use of iced compresses, atropin, and rest in bed.

Dr. Oliver showed a case which he had seen two hours after an accident, and in which a drop of eserine had been instilled, carrying a small iris prolapse back into its normal position, and giving a round pupil without any appearance of traumatism other than a small slightly concentric vertical cut through the cornea. The following day, the patient reported with a localized iritis, a spongy deposit upon the anterior capsule of the lens, and a deep mass of lymph in the bottom of the anterior chamber. Vision was reduced from practically normal to light perception. The patient was immediately admitted to the hospital and placed in bed. Hot compresses were employed, and changeable iridoplegics and cycloplegics were used. All of the signs of inflammation subsided and the patient one week after he had been injured recovered with full acuity of vision—two small posterior synechiæ in the position of the previously bruised iris alone remaining. He brought the case before the Society to illustrate a principle which he and Dr. Fisher had established in their hospital services a number of years ago—to immediately excise all prolapses of the iris tissue, no matter how small or recent they might be. Dr. FISHER agreed with Dr. Oliver in reference to the advisability of such a procedure, and had made it an unalterable rule to do this in all cases of this kind since the time mentioned.

Dr. ZIEGLER spoke of a case with the history that a piece of steel had been driven into the eye several years previously, cataract developing. The patient had been in the hands of

a practitioner who had failed to make use of X-ray study. The moment that Dr. Ziegler saw the case, he ordered radiographs to be made, with the result that a foreign body within the eyeball was recognized. The mass was immediately removed, the cataract extracted, and vision with glasses was brought to almost normal; thus proving the direct advantage of X-ray study in every suspicious case.

Dr. MCCLUNEY RADCLIFFE made mention of a case in which two sets of negative studies with the X-ray had been made in spite of the fact that he felt sure clinically that a foreign body was within the eyeball. A third series of plates gave an undoubted shadow with its localization. Immediate operation was resorted to, and a foreign body was successfully removed, leaving a useful and unirritated eye. The foreign body was two millimetres square in size. He also spoke of some rare types of traumatic cataract in which there was not any apparent external wound. In two cases that he had seen, the character of traumatism was extremely slight, one being the result of the shaking of a piece of light dress goods in which a closed eyelid was struck, and in which a resultant cataract was most probably caused by capsular breakage.

Dr. OLIVER gave a brief account of a case that he had seen two weeks previously, in which the findings of a carefully made X-ray study coincided exactly with those from a series of examinations of the visual field; it being his rule, whenever possible, to have the field of vision gone carefully over by a competent assistant. In this instance, a peripherally situated scotomatous area of positive type, sharply cut in outline, made him feel that either a small sector of the optic nerve had been injured or the adjacent retina had been seriously wounded. The foreign mass, a piece of steel some fourteen millimetres in length, most accurately located by Dr. William W. Sweet, showed that its posterior extremity was protruding through the posterior portion of the eyeball some two millimetres to the temporal side of the globe, and that it had cut the optic nerve in actual relationship with the lost portion of the field. An incision in the proper place being made, the foreign body was withdrawn upon the first essay of the magnet.

An informal discussion upon the use of iced compresses in cases of traumatism, both accidental and purposive, gave some interesting facts in regard to the first establishment of this form of practice in the hospital. Drs. Fisher, Oliver, and Ziegler related some details as to their difficulty in overcoming the many objections offered to the plan that they had encountered during the introduction of a method which is now so universally employed in the hospital, and which has met with so much success.

Dr. GOLDBERG gave a very carefully detailed account of a number of bacteriologic experiments which he had made with several different makes of **cosmoline**. As one of the results, he had found, among a great number of experiments, that certain kinds of cosmoline seemed germ free. His work, pursued with alkaline, acid, and neutral materials, gave findings which induced him to cover eyeballs that had been opened by traumatism with large masses of the germ-free variety of the drug. As a result, it is his belief that these types of material are of value in the treatment of open eye wounds, protecting them from the entrance of extraneous and harmful bacteria. He has now advanced sufficiently in the work to make clinical studies, some of which are in active progress. Thus far he has found that healing is more perfect and much more prompt with the use of the material than it is with other methods. In a number of his cases he had noticed that the patient had experienced the taste of the drug. Dr. ZIEGLER made mention of the fact that he had seen the drug employed empirically by others, and that he remembered that Dr. William F. Norris formerly used it to advantage in the hospital. Dr. OLIVER substantiated Dr. Ziegler's second statement, as he had often seen Dr. Norris successfully employ the then so-called refined makes of the material in many serious cases.

Dr. ZIEGLER gave a brief history of a case of **melano-sarcoma** about as large as a small bean situated at the corneo-scleral junction of the left eye of a middle-aged man in whom, six months previously, the growth appeared as a minute pigmented plaque. When the case was first seen, the patient had been advised immediate excision of the growth. At present the mass is lobulated, densely pigmented, and covers

one third of the cornea. The eyeball is involved and there is considerable injection. Just beneath the principal growth there is a small carious non-pigmented mass which presses into the lower lid.

Dr. GOLDBERG showed a number of specimens of several types of **sarcomata** in various stages and in different positions, giving brief histories of the same.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

BY MR. C. DEVEREUX MARSHALL.

THURSDAY, OCTOBER 18, 1906. PRIESTLEY SMITH, P. R. C. S., PRESIDENT, IN THE CHAIR.

MR. GEORGE COATS read a paper on **posterior scleritis, and infarction of the posterior ciliary arteries**. He referred to the first description of this condition by Fuchs in 1902, and to cases probably similar reported by Knapp, Wagenmann, and Salzer. Only two such cases had been submitted to pathological examination. In his own case the disease was not diagnosed during life, as the eye was already disorganized by iridocyclitis when first seen.

On dividing the globe, a peculiar round area 10mm in diameter was found above the papilla, in the form of a brown island, surrounded by a broad yellow moat or gutter. Within this area, the inner third of the sclera and the whole thickness of the choroid and retina were completely necrotic. There was no inflammatory thickening of the necrotic patch, but a moderate round-cell infiltration of the living tissues. The other changes in the eye were due to iridocyclitis and secondary glaucoma.

Mr. Coats pointed out that the amount of necrosis was out of all proportion to the inflammation, so that there must have been vascular obstruction. The necrosis was more extensive in the retina than in the choroid, and in the choroid than in the sclera, and this corresponded to the usual wedge shape of the infarction. The affected area would correspond to the distribution of one of the larger posterior ciliary vessels, and these vessels had but scanty anastomosis with each other.

The changes in the retina were closely similar to those found in the rabbit after ligature of the ciliary arteries, and in man after optico-ciliary neurotomy. The surrounding chronic inflammation was similar to that found in non-infective infractions elsewhere, and the chronic iridocyclitis was probably of the same nature, due to the diffusion of toxines of low virulence into the vitreous. There was some evidence of vascular obstruction in two of the other reported cases.

Mr. HOLMES SPICER read a paper on metastatic affections of the eye. The first case was that of a young man who had a sudden attack of pain in one eye, with obliteration of the central part of the field of vision. He was in good general health except for a large crop of boils on the buttocks from rowing at Cambridge. On examination of the eye three days after the attack of pain, a brilliant green mass was seen springing from the centre of the disk; it was round, sharply defined, and had no appearance of structure, such as hooklets. Its appearance suggested a parasitic cyst. It continued to grow, and was making the patient very ill. It was lacerated with a needle under ophthalmoscopic guidance, but it contained only some cloudy opaque material like pus. The eye was enucleated.

The swelling was found to be an *abscess in the substance of the retina*, having in its centre a large mass of *staphylococci*. The patient made a rapid recovery in health.

The second case was also that of a young man who had had a large boil on the neck, and was suddenly seized with pain in one eye with loss of sight. He had well-marked phlebitis of the retinal arteries in one eye, and slightly in the other. After prolonged treatment *one eye got well*, and *the other became quiet with loss of sight*. Two years later it became acutely inflamed and was then enucleated. Although very seriously ill at the time, he recovered promptly after removal of the eye, showing it to be the only part affected.

The third case was also that of a young man who had *retinal phlebitis*, followed by *local keratitis profunda*, after a serious attack of diarrhoea and ptomaine poisoning.

The fourth case was one of diffuse exudation on the surface of the choroid, invading slowly nearly the whole of it and producing in places detachment of the retina. This also

occurred in a young man suffering from a large crop of boils, on the neck. Treatment by antistaphylococcal injections was commenced, but he refused to continue it.

Dr. EDRIDGE-GREEN read a paper on observations on hue perception. These observations were made with an instrument by means of which the exact size of a portion of the spectrum which appeared monochromatic was ascertained, when it was isolated from the adjacent portions. Hue perception was found to be most accurate in the blue and yellow regions, though in most it was more accurate in the yellow region. Then there was a gradual diminution towards the centre and ends of the spectrum. Green came next, then violet, and lastly red.

Three facts were in accordance with Edridge-Green's theory of color perception, and were predicted by it, namely that the color perception of different individuals varies with the development of a color perceiving centre in the brain, that those with a greater development of this centre see more colors (points of difference) than those with a less development, and that colors appear in a regular order at the successive points of difference in a straight series.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD AND FOURTH QUARTERS OF THE YEAR 1905.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the Assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and Others.

Translated by Dr. MATTIAS LANCKTON FOSTER.

Sections I.-III. Reviewed by PROF. C. HORSTMANN,
Berlin.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

635. HERING, E. Outlines of the doctrine of light sense. *Graefe-Saemisch's Handbuch der ges. Augenheilk.* Second edition. Leipsic, W. Engelmann, 1905.
636. SCHWARZ, O. *Encyclopædia of Ophthalmology.* 13th part. Leipsic, 1905.
637. OELLER, J. *Atlas of Rare Ophthalmoscopic Conditions, with Supplementary Tables to the Atlas of Ophthalmoscopy.* Part 4, Wiesbaden, 1905.
638. UHTHOFF, W. *Ophthalmology. Stereoscopic Medical Atlas.* Leipsic, 1905.
639. HEINE. *Guide to Examination of the Eyes in General Diseases.* Jena, 1905.
640. JANKAU, L. *Vade mecum for Ophthalmologists.* Third edition. Leipsic, 1905.
641. NAGEL, W. *Tables for the Investigation of Color Perception.* Third edition. Wiesbaden, 1905.
642. ROTHENAICHER. *Single, Removable Disks with Test Letters.* St. Gallin, 1905.
643. BLACK, N. M. *A new series of semaphore charts for testing*

- the vision of railroad employees. *Am. Jour. of Ophthal.*, Feb., 1905.
644. COULOMB, R. *The Artificial Eye*. Paris, 1905.
 645. LAGRANGE, F. and VALUDE, E. *Encyclopédie française d'ophthalmologie*. Vol. v. Paris, 1905.
 646. LEWIN, L., and GUILLERY, H. *The Action of Drugs and Poisons on the Eye*. Berlin, 1905.
 647. V. POEHL, A., V. TARCHANOFF, J., and WACHS, P. *Rationelle Organotherapie unter der Berücksichtigung der Urosemiologie*. Part i. St. Petersburg, 1905.
 648. JACKSON, E., and DE SCHWEINITZ, G. E. *The Ophthalmic Year-Book for 1905*. Denver, 1905.
 649. OILLEMANN. *Einiges über constitutionelle Erkrankungen und Augenleiden*. Leipsic, 1905.
 650. BAUDRY, S. Blessures de l'œil à la suite d'accidents du travail. Simulation et aggravation volontaires. *Arch. d'ophthalm.*, xxv., pp. 465 and 531.
 651. BACH. Traumatic neuroses and accident estimates. *Zeitsch. f. Augenheilk.*, xiv, 3-4, p. 351.
 652. GROENOUW. Disturbances of vision and health insurance. *Klin. Monatsbl. f. Augenheilk.*, xliii., Beilageheft, p. 1.
 653. KAZAUROW, J. Determination of the percentage of the loss of working ability through injuries to the eyes. *Westn. Ophth.*, 1905, No. 4.
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 655. WASSINTINSKY, A. G. The vision satisfactory for military service according to the present law. *Russk. Wratsch*, 1905, No. 31-32.
 656. RUDIN, W. Protective glasses for workers in hard materials. *Westn. Ophthalm.*, 1905, No. 4.
 657. GUILLERY. Testing of vision. *Arch. f. Augenheilk.*, liii., 2, p. 148.
 658. SCHILLING. Indirect illumination of schoolrooms with gas and electric light. *Journ. f. Gasbeleuchtung u. Wasserversorgung*. 1905.
 659. STONER, G. W. Immigration. Medical Investigation of immigrants and the precautions taken by the government to exclude persons suffering from trachoma. *Medical News*, 1905, June 20.
 660. MEDEM, G. B. Influence of heredity, of the family, and of the school on the vision of students as a symptom of threatening degeneration of our youth. Poltowa, 1905.
 661. DASTOT. Should the truth be hidden from those who are threatened with blindness? *Soc. Belge d'ophthalm.*, June 11, 1905.
 662. NESE, E. N. Ophthalmology and its representatives in the University of Kiew since the foundation of its medical faculty. Beilage to the *Westn. Ophthalm.*, 1905, No. 4.
 663. PANSIER, P. The ophthalmological practice of Daviel (1735 to 1744). *Annal. d'Ocul.*, cxxxiv., p. 338.
 664. HIRSCHBERG, J. My third journey in America. *Medizinische Klinik*, 1905, Nos. 42-46.

665. DISTLER. The Stuttgart eye hospital for the poor. Ten years of medical activity. *Wuerlemb. med. Corr.-Bl.*, 1905, No. 45.

666. WOOD, C. A. The mammalian eye with special reference to the fundus appearances. *Amer. Jour. of Ophthal.*, Oct., 1905.

HERING (635, Outlines of the doctrine of light sense) describes first the nature of colors and then the natural color system.

The thirteenth number of SCHWARZ's (636, Encyclopædia of ophthalmology) Encyclopædia contains in alphabetical order the articles "Nachstaroperationen" to "Neuritis optica."

The fourth number of OELLER'S (637, Atlas of rare ophthalmoscopic conditions, with supplementary tables to the atlas of ophthalmology) atlas is a completion of his *Atlas der Ophthalmoscopie* which first appeared six years ago. It contains five plates, one of a case of retinitis proliferans, one of retinitis disciformis of the macula lutea, one of a cured detachment of the retina and sclerosis of the choroidal vessels, another of sclerosis of the choroidal vessels, and one of a direct rupture of the choroid.

The ophthalmological part of Neisser's stereoscopic medical atlas, edited by UHTHOFF (638, Ophthalmology), consists of the 53d and 54th numbers. In the 53d Wernicke furnished 12 plates on which are depicted a lid with an aperture, a peculiar pair of glasses, an acute lymphadenitis, a side of a face covered by a pigmented nævus, a spastic ectropion of the upper lid, a vernal catarrh, a conjunctival cyst, a glioma, a gummatous iritis, a lamellar cataract, a hyaloid artery in a six-months-old foetus, and a papilloma of the iris. In the 54th number Wanner furnishes 12 plates on which are depicted a case of papilloma of the conjunctiva and cornea of the left eye, a globe with papilloma of the conjunctiva and cornea, lupus of the face, herpes zoster ophthalmicus, congenital coloboma of the upper lid, a double congenital coloboma of the lower lid, a ptosis adiposa of the upper lid, a cicatricial ectropion of the lids, ulcers of the lids from tertiary syphilis, Basedow's disease with a high degree of exophthalmus, solitary tubercle of the iris, and a case of oxycephalus.

HEINE (639, Guide to examination of the eyes in patients with general diseases) tells how an examination should be

made in order to determine whether any eye symptom exists which is of importance in the general diagnosis. The objective and subjective examinations are systematically described and the symptoms of such diagnostic help are arranged according to their frequency and importance. The work is based almost wholly on the author's experience, very slightly on literature.

JANKAU's (640, *Vade mecum for ophthalmologists*) contains a calendar for 1906 and 1907, general information regarding food and its preparation, and drugs. The special part contains anatomical and physiological points in regard to the eye, fitting with glasses, estimation of accidents, together with clinical and therapeutic hints. Then follows a register. It is insufficient and incomplete.

The best proof of the usefulness of NAGEL's (641, *Tables for the investigation of color perception*) is that they have been officially adopted by the railway administration.

BLACK (643, *Semaphore charts for testing the vision of railroad employees*) has designed charts which reproduce the signals used on the railroad in their original color on a green background. The size is so proportioned that the distance of 20 feet corresponds to that of half a mile in actual service.

ALLING (F.).

In the first part of his work COULOMB (644, *The artificial eye*) gives the history of artificial eyes. He describes those of ancient statues and of mummies as well as the prostheses mentioned in the Talmud and by the ancient Romans. Later glass eyes came into use, and enamel about the beginning of the nineteenth century. The latter, vulcanite, and celluloid are still used. A chapter deals with their manufacture, another deals with the variations necessary in form, color, and mobility. The disturbances occasioned and the operations sometimes necessary to be performed in order to render the use of a prosthesis possible are also described.

The fifth volume of LAGRANGE and VALUDE's (645, *Encyclopédie française d'ophtalmologie*) encyclopædia contains Glaucoma and the sympathetic diseases of the eye by Gama-Pinto of Lisbon, The diseases of the lids by A. Terson of Paris, The tumors of the lids by Felix Lagrange of Bordeaux Diseases of the conjunctiva and diseases of the cornea by V.

Morax of Paris, Diseases of the sclera by Rohmer of Nancy, and The tumors of the conjunctiva, cornea, and sclera by F. Lagrange of Bordeaux.

LEWIN and GUILLERY (646, *The action of drugs and poisons on the eye*) describe in their first volume the paralysants and the excitants of the nervous system, together with the materials which produce chemical or physical changes in living albumin. The second volume contains antipyretics and antisepsics, tæniacides, drugs which affect the function of the heart, vessels, and kidneys, and those which act indirectly or mechanically on the eye. The work is an excellent compilation of the poisons and drugs which affect the eye.

The Ophthalmic Year-Book for 1905, by JACKSON and DE SCHWEINITZ (648, *The ophthalmic year-book for 1905*), is a compilation of the most important advances in ophthalmology during the past year.

The great work of BAUDRY (650, *Blessures de l'œil à la suite d'accidents du travail. Simulation et aggravation volontaires*) in regard to the injuries to the eyes of laborers and the voluntary simulation or aggravation of the same is unsuited to a brief review

BERGER.

According to BACH (651, *Traumatic neuroses and accident estimates*), a traumatic neurosis appears in the eye as a muscular spasm either of the muscles of the globe or of the muscles of the lid, as a trophic disturbance making the brows and lashes gray, as vasomotor disturbances shown in slight cyanosis of the lids, hypo- and anaesthesia of the conjunctiva and cornea, rarely hyperesthesia; inequality of the pupils and marked dilatation of the pupils are relatively frequent. Visual disturbances which greatly resemble those of hysteria are frequent, such as a concentric contraction of the field. The prognosis of a traumatic neurosis is usually unfavorable. A considerable improvement is met with, but no cures.

According to the experience of GROENOUW (652, *Disturbances of vision and health insurance*), inability to earn a living, in the sense of the health-insurance law, appears in the callings with slight optical demands when the vision of the better eye has been gradually reduced to less than $\frac{1}{10}$. In callings with greater optical demands reduction of the vision to $\frac{1}{5}$ or $\frac{1}{4}$ produces usually inability to follow that occupation

and not seldom inability to earn a living in the sense of the law. Not too important defects of vision and even hemianopsia usually cause only a transient invalidism. These boundary cases must be each adjudged individually, especially when they relate to persons who are otherwise sound and vigorous and not too old.

KAZAUROW (653, Determination of the percentage of the loss of working ability through injuries to the eyes) finds that Zosten's tables are not uniform and favor the employer at the expense of the employed. Zehender's formula is on the contrary unfairly in favor of the employed. He therefore advances this modification of Zehender's formula as more uniform and fair to both parties.

$$z = 100 \left(1 - \frac{2(a+b)}{3}\right)$$

HIRSCHMANN.

WILMSEN (654, The injuries to the eye in the Marbourg clinic) reports 1271 persons treated for injuries of the eye at the Marbourg eye clinic: 270 were foreign bodies in the cornea, 38 lime-burns, 73 simple ulcers of the cornea and 103 cases of *ulcus corneæ serpens*, 85 cases of perforating wounds of the cornea, 35 cases of traumatic cataract, and 28 perforating wounds of the sclera. There were 5 cases of sympathetic ophthalmia.

According to GUILLYERY (657, Testing of vision), there is no special dependence of the minimum visible on the light sense. The minimum visible furnishes a measure for the determination of the visual acuteness.

According to SCHILLING (658, Indirect illumination of schoolrooms with gas and electric light), gas illumination is not only equal to electric as regards clearness and even division of light, but superior in halls where moderate illumination of not great height is required.

According to STONER (659, Immigration; medical investigation of immigrants and the precautions taken by the government to exclude persons suffering from trachoma), 600,000 immigrants arrived in New York during 1904; 787 were refused admission because of trachoma. The law pronounces trachoma to be dangerous and all immigrants who present this disease in its florid stage are excluded. A fine of \$100

is also imposed in cases where a later examination reveals the presence of trachoma and it is suspected that deception was practised at the landing place. Chronic, latent cases are not excluded. Acute cases may be retained in the hospital for a time for the purpose of observation. **ALLING.**

This statistical work brings MEDEM (660, *Influence of heredity, of the family, and of the school on the vision of students as a symptom of threatening degeneration of our youth*) to the conclusion that the rules which regard hygiene of the vision in the ordinary schools are only palliative, and that the defects which appear with the first instruction at home develop further in school. The hygiene must begin at home under the oversight of the mother. **HIRSCHMANN.**

PANSIER'S (663, *The ophthalmological practice of Daviel*) account of the ophthalmological activity of Daviel from 1735 to 1744 is a valuable contribution to the history of ophthalmology.

HIRSCHBERG (664, *My third journey in America*) furnishes some interesting notes on ophthalmological conditions in North America and describes the meeting of the Ophthalmological Section of the American Medical Association in Portland.

DISTLER (665, *The Stuttgart eye hospital for the poor*) describes the hospital, the operations performed, the injuries treated, and other work done therein during the past ten years.

WOOD (666, *The mammalian eye with special reference to the fundus appearances*) presented, at the meeting of the American Academy of Ophthalmology a description of the fundi of the mammalia, illustrated by colored stereopticon slides. His observations were largely taken from the work of Geo. Lindsay Johnson published a few years ago and now out of print. The illustrations are from paintings by A. W. Head many of which have not yet been published. A classification of mammals is first given and those are designated whose fundi were shown as typical of the various orders, families, and genera. Johnson has divided the mammalian fundi into three categories according to color. Red Type—Man and the Primates. Yellow Type—an example of which are the animals of nocturnal habits. Green-Yellow Type—some of the Carnivora and Ruminants. An interesting fact

is that many of the normal conditions observed in the lower animals resemble those found in man as pathological, such as membrana nictitans, retractor muscle, opaque nerve fibres, persistent retinal artery, optic coloboma, retinitis pigmentosa, etc. The refraction in wild mammalia is hypermetropic, but when they have been domesticated for a number of generations they generally become myopic and astigmatic. Man and the simiae possess a distinct fovea centralis; others have sensitive visual areas, but, on the other hand, in many animals there is nothing to indicate that one locality of the retina is more sensitive than another. Concerning divergence of the optic axes, it is a fact that only man and the true monkeys have the power of convergence and parallel optic axes with eyes in a state of rest. In the lemurs or half monkeys there is no macula and the disk is white as if atrophic; Insect-eating animals have a uniform gray background. Seals have brightly colored fundi—yellow sprinkled with green dots in the common seal. The cat and hyena tribes have three colored zones—central light gold and brilliant, then emerald green, with the periphery dense purple-brown. In all carnivora the disk is round and cupped. In the ruminants the disk is horizontally oval and large with central depression. In these the intermediate rose-colored zone is believed, by Johnson, to be the area of acute vision. Among the rodents the squirrel has a large white elongated nerve head and the nerve fibres are visible radiating from the edge of the disk. The rabbit has a vermillion red fundus. The disk is ovoid and white and the retinal vessels branch right and left horizontally accompanied by two dense brushes of opaque nerve fibres. It would seem that the examination of animals should be employed as an aid to classification by practical zoologists, and that light may be thrown on the anatomy and pathology of the human eye by these means.

ALLING.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND TREATMENT.

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The child reported by Clark (667, Case of cryptophthalmos) was a Mohammedan aged 6 months, whose eyeballs were completely covered with skin. There were no eyelashes. The eyeballs were prominent and the child could move them. An incision was made over the left globe and it was found

that the conjunctival sac was complete only towards the lachrymal gland and in the internal and lower segment. The cornea was covered with a loosely attached membrane, but no pupil could be seen when this was dissected away. The child had also webbed fingers. There was no sign of syphilis.

MARSHALL.

BERGMEISTER (668, *Injuries of the eyes from ink*) has observed that sometimes a severe purulent inflammation may be excited by pricking the cornea with ordinary ink. The cause of the inflammation was shown by experiments to be the necrosis of the corneal tissue in the neighborhood of the injury produced by the constituents of the ink. Aniline dyes which contain no free acid cause no true inflammation or necrosis of the cornea, but are injurious when applied in powder to the conjunctiva.

ROTHHOLZ (669, *The treatment of the so-called scrofulous inflammations of the eye*) calls attention to the fact that a large number of cases of apparent scrofulous inflammation may be caused by nasal suppuration. The nasal condition should receive careful attention. He recommends atropine when photophobia is present, and airol ointment (1:14) for the conjunctival affection. Yellow precipitate ointment should be used as soon as the corneal irritation has subsided.

SCHEIN (670, *Excessive pigmentation of the human eye*) reports four cases of excessive pigmentation of the eye. In three the sclera, iris, conjunctiva, and choroid were affected, particularly the sclera, in the fourth the conjunctiva.

In all three cases reported by GURFINKEL (671, *Melanosis oculi*) there was an abnormal pigmentation of the left eye alone. In one case the skin of the lids was covered with spots of pigment as well as the sclera, subconjunctival tissue, and conjunctiva, the iris was of the color of a black cherry, the inner parts of the eye were normal. In the second and third cases the skin was normal, and the pigmentation affected the conjunctiva, sclera, and retinal pigment layer. In one of these cases four patches of pigment were present on the papilla.

HIRSCHMANN.

According to DEMARIA (672, *Tuberculous panophthalmitis*) an endogenous tubercular infection of the eye may run the course of a subacute panophthalmitis. In the case he reports

there was a mixed infection of tubercle and pseudodiphtheria bacilli. The latter were concerned in the purulent character of the inflammation. Many bacteria of the diphtheria group are very pathogenic in the eye, even the filtered cultures show this pathogenic character. It is particularly noticeable that after injection of the filtrate into the vitreous there was an extensive detachment of the epithelium of the anterior capsule.

In addition to the description of a case in which there was a transient change in the macula due to blinding by the sun, PIETRULLA (673, *Diseases of the eye due to too great light*) describes the diseases caused in the eye by over-blinding. Experiments show the same as clinical experience that under certain conditions light may be injurious to the eye. The injuriousness of a source of light is dependent on its short waved rays, the greater the proportion of such rays the greater is its power for injury to our eyes.

DORLAND SMITH (674, *Eye infection*) found, in 65 cases of infectious conjunctivitis, staphylococcus 14 times, pneumococcus 12 times, gonococcus 6 times, Morax-Axenfeld's diplobacillus 6 times, meningococcus once, diphtheria bacilli once, and streptococci 3 times. In 10 cases of corneal disease, streptococci were found 4 times, staphylococci twice. In 10 cases of dacryocystitis, pneumo- and streptococci were found in 7.

ABELSDORFF.

DUCLOS (675, *Bacteriological studies of post-operative infections*) has observed 9 cases of panophthalmitis which followed cataract extraction. In 7 pneumococci, in 2 streptococci were present. The two forms of infection differ clinically. In a pneumococcus infection a plug of pus is formed in the wound and extends into the eye. In a streptococcus infection cloudiness of the cornea and iris quickly appears. In the majority of the cases disease of the lachrymal passages was present, in the others there were diseases of the conjunctiva or of the margins of the lids. In no case was sugar or albumin found in the urine. Duclos believes that the influence of diabetes or of albuminuria over the production of panophthalmitis after cataract operation has been greatly exaggerated.

BERGER.

CHAILLONS (676, *Two cases of traumatic infection of the eye*

with an anaerobic microbe) describes 2 cases of traumatic infection of the globe by an anaerobic microbe which caused panophthalmitis. He describes minutely the peculiarities of this microbe, which he has named the "bacillus perfringens."

BERGER.

According to MOBILIO (677, *Prognosi e trattamento delle ferite bulbare per arma da fuoco*) the seriousness of shot wounds of the eye depends first of all on secondary infection. Enucleation is unconditionally indicated only when serious inflammatory symptoms are present and show a progressive character. If the shot is in the anterior chamber the irritation may be purely mechanical and relieved by the removal of the foreign body. The presence of a shot in the posterior part of the eye causes no severe irritation in the absence of infection.

CIRINCIONE.

LIETO VOLLARO (678, *Ricerche sul contenuto microbico della congiuntiva nel trattamento post operativo senza fasciatura occlusiva*) comes to the following conclusions:—1. Even with Czermak-Fuchs after-treatment of operations an increase of the microbes in the conjunctiva is present a certain number of hours after the operation. 2. This increase is less with this treatment than when an occluding bandage is applied. The microbes found after the operation are the same as those found before the operation. CIRINCIONE.

BIETTI (679, *Sul valore patogeno del bacillo del calazio di Deyl*) presents the results of his investigations regarding the frequency with which the so-called xerobacillus, identical with Deyl's bacillus, is met with in chalazia. He instituted a series of experiments in which he injected bouillon cultures of the xerobacillus beneath the palpebral conjunctiva of rabbits and concluded from them that the so-called experimental chalazion may be a product of various micro-organisms independently of their virulence, and that the xerosis bacillus is not specifically fitted for the production of a chalazion. Probably the various micro-organisms exercise an irritant action similar to that of the xerosis bacillus, like foreign bodies.

CIRINCIONE.

Ovio (680, *Traumatismi oculari da caustici*) applied to the surface of the eye of rabbits the various chemical caustics

which are used in ophthalmic practice. From these experiments he learned that burns with acids are in general less severe than those with alkalies. A drop of nitric or sulphuric acid is sufficient to destroy the eye. Acetic acid is less powerful, diluted with water it can still give rise to indelible spots. Caustic potash is even in dilution stronger than the above named acids. Its greater strength depends on the fact that the size of a drop of a saturated, watery solution of potash is twice as large as that of a drop of sulphuric acid. Tincture of iodine, chloroform, ether, alcohol, carbolic acid, and concentrated solutions of corrosive sublimate are harmful to the eyes.

CIRINCIONE.

POLATTI (681, *La panoftalmite a bacillus subtilis*) reports a series of experiments in which he injected pure cultures of the bacillus subtilis or emulsions of earth into the vitreous of rabbits, or introduced foreign bodies artificially infected with the bacillus. Control experiments were maintained. The chief conclusion arrived at was that the pathogenic action of the bacillus subtilis which originates in the earth cannot be doubted when introduced into the vitreous.

CIRINCIONE.

BIETTI (682, *Ricerche sperimentalì sulla rigenerazione dei nervi ciliari dopo la neurectomia ottico-ciliare*) experimented on dogs which he killed from nine months to over two years after he had performed on them neurectomia opticociliaris. The results of these investigations show that no cord was formed between the two stumps of the optic nerve to reunite them. There was not a complete degeneration of the nerve cells of the ciliary ganglion. The experiments indicate that regeneration of the ciliary nerves may take place to a greater or less extent.

CIRINCIONE.

MAGNANI (683, *Contributo alla terapia della ipotonia oculare*) reports several cases of hypotony which he treated by galvanic stimulation of the superior cervical ganglion of the sympathetic. Encouraging results were obtained in four cases.

CIRINCIONE.

A great part of the cases of tetanus complicated by injuries to the eye should not have the eye injury looked upon as the etiological factor. According to ULRICH (684, *Tetanus infection of the eye*) the tetanus bacillus behaves in the eye of

a rabbit just the same as in the rabbit's body, it cannot grow well and the animal is not seized with tetanus. On the contrary the intraocular injection of any bacteria brings about tetanus infection of the eye following local inflammatory symptoms. Eight days after the infection of the anterior chamber the tetanus germs were still in the aqueous and after five weeks they could be demonstrated by cultures in the iris.

V. MICHEL (685, *Tetanus after injury to the eye*) reports a case of injury with a stick followed by exophthalmos with chemosis and suggillations, and also amaurosis with the ophthalmoscopic picture of occlusion of the central artery. Then followed high fever, vomiting, lockjaw, and rigidity of the neck. Exenteration of the orbit with resection of a piece of the roof of the orbit showed that the meninges were intact, but revealed a piece of wood between the superior orbital fissure and the optic foramen. Death followed in spite of injections of tetanus serum into the dural sac. On autopsy there was found a hemorrhage in Tenon's space, purulent infiltration of the orbital cellular tissue which had extended to the arachnoid and pia and along the septa of the optic nerve.

According to the experiments of ROSENTHAL (686, *Glasses as a protection against, and a carrier of, infection*) glasses exercise a certain limited degree of protection against infection. It seems to be more important that otherwise infected glasses may be a source of danger to the wearers and that the protective glasses worn in inflammatory diseases of the eye should be carefully cleansed and disinfected.

KOSTER (687, *Treatment of ocular tuberculosis with tuberculin*) uses tuberculin in tuberculosis of the eye when the usual treatment and the insufflation of air into the anterior chamber have failed, that is when the choroid and ciliary body are involved, and has obtained good results. JITTER.

According to ELSCHNIG (688, *ocular diseases from auto-intoxication*) a large number of inflammatory diseases of the cornea, sclera, (including severe recurrent scleritis) and uvea are referable to autointoxication of gastrointestinal origin. The only general treatment which promises a result is regulation of the diet and of the intestines with repeated intestinal disinfection. Two forms of iridocyclitis depend usually on

intestinal autointoxication, the first is particularly common with women, running a chronic course with numerous precipitates, synechiaæ and vitreous opacities, which is characterised by its lingering character and innumerable remissions and exacerbations. The second form is the recurrent iritis.

GROYER (689, *Ocular diseases and gastro-intestinal auto-intoxications*) confirms Elschnig's views. In most of his cases indican could be found in the urine.

UHTHOFF (690, *Ocular injuries due to injections of paraffine*) reports two cases in which serious injuries to the eyes followed injections of paraffine into the nose for cosmetic purposes. In one case, that of a woman 45 years old, the injection was followed by the typical picture of embolism of the central artery of the retina. The eye was permanently blinded. A minute particle of paraffine in fluid condition must have entered the circulation and been carried into the central artery of the retina. In the second case, that of a man 57 years of age, three injections of paraffine were made. Then the lids became greatly thickened so that the patient could no longer open his eyes.

ROHMER (691, *Ocular injuries due to injections of paraffine*) describes a case of monolateral amaurosis which resulted from paraffine injection. Several injections of vaseline paraffine were made to cosmetically correct a nasal deformity produced by necrosis in a woman 42 years old who had had primary syphilis 15 years before. After the last injection there was severe pain caused by a thrombosis of the orbital vein with consecutive thrombosis of the retinal veins, which resulted in the ophthalmoscopical picture of hemorrhagic retinitis. The injection had been made with too great intensity and had advanced to the inner canthus. In order to avoid similar accidents Rohmer recommends to use paraffine with a low melting point, to inject only small quantities several times without great pressure, and to prevent by the pressure of the finger of an assistant the advance of the paraffine into the neighboring tissues which are not to be injected.

BERGER.

BOLOGNESI (692, *Injections of paraffine*) reports a number of experiments with melted paraffine, the melting point of which was somewhat higher than the body temperatures of

the animals used, in the tissue of the cornea, in the anterior chamber and in the orbit after enucleation, and gives the pathological results obtained. The substance acted as an aseptic foreign body and was encapsulated by newly formed connective tissue from which dividing walls extend which cut the paraffine into smaller portions. No chemical action was observed, either locally or at a distance. There seemed to be no tendency to the formation of emboli, such as were met with in paraffine injections of other organs. In brief the pathological condition corresponds simply to the mechanical action of the paraffine upon the elements of that tissue of the eye with which it was experimentally brought in contact.

CIRINCIONE.

LEBER (693, *Notes on the mensuration of the filtration of the eye*) undertook with Pizecker to determine whether their view was correct that with a constant intraocular tension the same quantity of fluid which enters an eye must also escape. To their great astonishment these results showed that this theory was not absolutely correct. Too great elasticity has hitherto been ascribed to the capsule of the eye. Probably the increase of volume of the eye without a permanent increase of the intraocular tension is to be explained by a change in the curvature of the wall of the globe which more nearly approaches the form of a sphere. The results of the experiments do not alter the objections which Leber has raised to the theory of glaucoma advanced by Uribe y Troncoso.

BERGER.

Ovio (694, *Case of bilateral anophthalmos*) describes in an infant born at full term which died a few days after birth properly formed though somewhat sunken lids, with a conjunctiva which formed a funnel with a short canal leading into the orbit. No trace of eyeball could be seen. Well developed muscles with numerous glands were present, all in the midst of partly loose, partly fibrous connective tissue. It appeared to be a case of true bilateral anophthalmos.

CIRINCIONE.

RAVE (695, *Intraocular injections of iodoform*) had 8 unfavorable results out of 17 cases treated with intraocular disinfection with iodoform. In the other cases there was at least preservation of the globe in a quiet condition. Iodoform

was introduced three times after post-operative infection. One case was an ordinary one of intraocular suppuration which began suddenly and ran a rapid, unfavorable course, in one case it was the result of corneal infection and the remaining 12 were caused by injuries. The iodoform was introduced after a hypopyon was present. Seven of the cases in which the eyes had to be removed were cases of perforating wounds.

In his work *Serumtherapie bei infektiösen Augenerkrankungen*, AXENFELD (696, Serum therapy in infectious diseases of the eye) speaks first of this treatment as applied to infection of the eye with diphtheria bacilli. According to his experience the serum should be used immediately in every case of pseudomembranous conjunctivitis in which Loeffler's bacilli are present, because the relatively mild cases may be complicated with severe, even fatal, diphtheria of the throat, the origin of which may be traced from the eye through the naso-lachrymal duct to the throat. The mild cases also are just as contagious as the severe, and may cause very severe diphtheria in other persons. The serum is best administered by subcutaneous injection. The second part of the work deals with the serum treatment of pneumococcus infection of the eye, *ulcus serpens* and wound infection. According to his observations a beneficial influence of Römer's serum therapy on *ulcus serpens* cannot be recognised. For prophylaxis in corneal injuries with unclean surroundings the combination of the use of Römer's serum with that of dead cultures is recommended. After the disease is established the serum therapy alone is justified only in the first stage, afterward the simultaneous method. When undertaken successive increasing doses are indicated; if the ulcer advances continued serum treatment may in many cases check it. But for such ulcers doses of over 30ccm are not permissible. Very large doses, even when they check the disease are, aside from their great cost, no improvement over the galvano-caustic because finally the scar will be very extensive and a cure is uncertain. It is not advisable to confine the treatment to serum in moderate and large ulcers, with the exception perhaps of very superficial relatively benign cases, in which expectant treatment is permissible or if very severe

ones in which the older treatment is inapplicable or has failed. Another use of the serum is for pneumococcus infection after deep injuries or operations. Here also prophylaxis occupies the first place for it is difficult to influence the established disease.

Serum therapy plays no great part against streptococcus infection in ophthalmology because the cases are rare. Good results from the use of Marmorek's serums in dacryocystitis were reported. Serum therapy against staphylococcus infection is of still less importance because of the infrequency of such cases in the eye. The ordinary staphylococcus lid abscess heals readily after incision.

Ovio (697, *Actual cautery*) writes: The mechanism of the beneficial effect produced by the actual cautery in certain affections of the eye is well known. But there are cases in which such cauterization is of benefit while the mechanism of its action is not apparent; as in extensive ulcers, abscesses and purulent wounds of the cornea. For in these cases the entire portion affected cannot be involved in the destructive action of the cautery and yet through it the favorable influence is impressed on the disease. The author concludes from the experiments he has undertaken, that the results produced by the actual cautery are twofold. First there is destruction followed by a stimulated process of regeneration in the tissue, and in consequence of this stimulation the tissue is permeated after the cauterization with numerous active elements. Everyone understands how advantageous the attainment of such processes may be when they are produced in diseased tissues the elements of which are from more than one cause in bad nutritive condition. CIRINCIONE.

Ovio (697A, *Actual cautery*) gives a historical resume of the use of the actual cautery about the eye and then discusses its practical application. The cauterization of the appendages of the eye which was used so much formerly has now been almost completely given up with the exception of the ignipuncture for telangiectatic tumors. The use of the actual cautery is necessary and advisable to the base of malignant ulcers of the limbus, after removal of a pterygium to its remains on the cornea in order to bring it to cicatrization before the conjunctiva, to residues of corneal pannus in the

form of a peritomy when there are some large vessels which spread out on the cornea, and in phlyctenular keratitis with a tendency to the formation of abscesses. In progressive ulcers keratotomy and cauterization are of equal value when the ulcer is circumscribed. If the ulcer is diffuse cauterization is of less value, so that a few days later keratotomy will be performed. In very severe cases in which the ulcer occupies two-thirds or more of the cornea while the rest is hazy and a hypopyon is present cauterization and keratotomy should be performed simultaneously.

CIRINCIONE.

TARTUFERI (698, *Su di uno terza nuova impregnazione metallica dei tessuti e specialmente della cornea*) presents a modification of the procedure for metal impregnation. Before he submits the tissue to the action of the sodium thiosulphate and the silver chloride he fixes it for a short time in a 1 % sublimate solution.

CIRINCIONE.

SYM (699, *Note on Atropine irritation*) observed a case in which watery solutions of atropine caused a dermatitis, while a solution in pure olive oil sterilized by heat could be used without the production of irritation of the skin. He used ichthysol for the dermatitis.

DEVEREUX MARSHALL.

GIERTZ (700, *The action of radium on the eye*) has made some experiments in order to determine whence comes the fluorescence which produces the diffuse greenish light that appears when a preparation of radium is approached to an eye adapted to the dark. He used bromide of radium enclosed in a lead tube with its end hermetically closed. He thinks that the light seen when a preparation of radium is held before the eye is the fluorescence which is formed in the portion of the eye in front of the iris, probably the eyelids, and that no impression of light is obtained when this part is not hit by the radium rays. He has not seen any bad after effects of the radium rays.

HELLGREN.

HOLTH (701, *Roentgen ray diagnosis and extraction of foreign bodies from the eye*) uses two plates, one bitemporal, the other occipito-frontal, and two little indicators of lead fastened in the bulbar conjunctiva close to the limbus corneæ in the vertical meridian.

HELLGREN.

HOLTH (702, *Localization of foreign bodies in the eye by means of the ultra violet rays*) recommends the following

method. After cocainization a plano-convex piece of lead is sutured to the conjunctiva at the upper and lower margin of the cornea. The head of the patient is secured in a head-rest, such as used by Helmholtz in the investigation of the movements of the eye. A bitemporal and a frontal plate is used. If the foreign body lies 23mm behind the centre of the cornea of an emmetropic eye it is to be assumed to lie in the eye itself. If the distance is from 24 to 27mm it is to be assumed that the foreign body has perforated the posterior wall of the globe. In cases of ametropia 1mm is to be added for each 3D of myopia, or subtracted for hypermetropia. The refraction of the injured eye cannot usually be determined because of the cloudiness of the media and in those cases the refraction of the uninjured eye should be determined and assumed as correct for the injured one. In cases of marked anisometropia an exact localization cannot be obtained by this method. HOLTH reports some very excellent results.

BERGER.

DOR (703, How to protect the eye against the ultra-violet rays) refers to the investigations of Widmark, Bireh-Hirschfeld and others who have shown that the ultra-violet rays are injurious to the cornea, lens, and retina. By means of photography he has found what kinds of glass absorb these rays. He finds that yellow protective glasses are the best. Some smoky gray glasses absorb a portion of the ultra-violet rays but also a great part of the light rays. Flint glass, which is recommended in commerce for the absorption of the ultra-violet rays, allows them to pass. He suggests that the glasses which absorb the chemically acting rays should be denominated "achemic."

BERGER.

The method used by SCHMEICHLER (704, Detection of simulated monocular amblyopia) was to place a strong convex lens (20D) before the supposed good eye which would exclude its vision for distance and while the patient thought that the good eye was being tested the vision of the bad one was determined.

PERGENS (705, The influence of size and number on the measurement of the visual acuteness) comes to the following conclusions. 1. Two squares are more easily recognized than a larger number. 2. The difficulty of counting them

increases with the size of the squares. 3. The length of the letters has a varying influence on the visual acuteness. The latter is best when the length is from 4 to 6 times the horizontal diameter.

BERGER.

PARDO RUGGERO (706, *Use of roentgen rays*) has used the roentgen rays in cases of trachoma, follicular and vernal catarrh, episcleritis, and scleritis. In trachoma it brought about a disappearance of the follicles, of the pannus and of all signs of inflammation without the formation of a cicatrix. The results were uncertain in follicular and vernal conjunctivitis, good in scleritis and episcleritis. CIRINCIONE.

In order to protect the eyes during radiotherapy V. DUYSE and DE NOBELE (707, *The protection of the eye in radiotherapeutic treatment of parts neighboring in that organ*) cover that organ with a lead covered glass plate.

GOLESCEANO (709, *Steam treatment of the eye*) recommends the application of hot steam (45 to 50°C) in diseases of the lids, conjunctiva, and anterior segment of the globe, for which purpose he has designed a special instrument. He has obtained good results in blepharitis ciliaris ulcerosa bilateralis, blepharitis scrophulosa, keratitis phlyctenularis parenchymatosa, herpes febrilis corneæ, infiltrates of the cornea, scleritis, iritis. In diseases of the eye dependent on nasal disease, endonasal applications of hot steam containing the vapor of menthol 2 parts, guiacol 5 parts and spirits of camphor 80 parts were employed.

BERGER.

LAGRANGE (710, *Amelioration of the prothesis of a graft from the eye of a rabbit*) reports 8 cases in which he made transplantations from the eyes of rabbits in order to obtain a better prothesis.

According to TORNABENE (711, *Influenza della iridectomia, dei miotici, dei midriatici e degli anestetici sul passaggio nella camera anteriore di alcune sostanze iniettate sotto la cute*) when an iridectomy is performed with a scleral incision not only is the escape of the endocular fluids increased, but the production of the aqueous is also hastened and increased, while no such influence is exhibited when the incision is in the cornea. The transition of fluorescein and iodide of potassium into the fluids of the eye takes place more quickly and in greater quantity when cocaine, eserine, or pilocarpine

has previously been instilled. Atropine has a diametrically opposite effect.

CIRINCIONE.

BORTHEIN (712, *Open wound treatment*) has used the open treatment after operations of the eye recommended by Hjort since 1895, and goes so far as to treat his patients operated on for cataract as walking cases and without a bandage. He emphasizes the importance of the movements of the lids for the cleansing of the eye and that the eye is less hyperæmic when it is not tied up. The open treatment is more convenient for both the patient and the surgeon. In prolapse of the vitreous healing is obtained more readily through the gentle pressure of the lids than under a dressing, if the patient will only keep his eye closed voluntarily for the first few hours after the operation and wink only occasionally. Incarceration of the iris does not occur any more frequently in connection with the open treatment than under a dressing. When the lachrymal sac is diseased the open treatment is particularly indicated.

HELLGREN.

THOMPSON (713, *Recent modifications in the technique of some operations on the globe and the adnexa*) leaves the conjunctiva open in advancements until the knots have been tied, then with the same suture inserted in the right place he closes the wound. In extirpation of the lachrymal sac he introduces a probe and divides the overlying tissues upon this. Then he carries a suture about the sac by means of a hook at the level of the commencement of the nasal duct. After excision of the sac the latter is drawn forward and removed.

ALLING.

HANSELL (714, *Diaphoresis in ophthalmology*) warmly recommends diaphoresis except in cases of chronic syphilitic disease of the uveal tract, traumatism and cases of unknown etiology. Steam baths are better than pilocarpine. The patients are placed in a bath of about 160° F. for ten to twelve minutes and then tucked up in bed where they perspire freely. Medicaments are superfluous.

ALLING.

GIFFORD (715, *On some unusual effects of iodide of potassium*) has seen many times a phlyctenular eruption on the conjunctiva. In one case yellow pustules appeared at the margin of the cornea which contained xerosis bacilli and staphylococcus albus. In another case a little abscess formed in the

deep layers of an old corneal scar. He enumerates various complications which are mentioned in literature, such as fatal gastritis, œdema of the larynx, parotitis, dacryocystitis, otitis media, psychic affections and purpura. He has seen two cases of the last named disease.

ALLING.

BULLARD (716, *The use of pure nitric acid in the treatment of diseases of the eye*) considers nitric acid to be the best chemical cautery for the eye, but it is difficult to see how it surpasses the thermocautery.

ALLING.

POST (717, *An experience with staining the skin by argyrol*) found the eyelid shining black a day after an injection of argyrol into the cavity left by the removal of a chalazion. He ascribes the cure, at least in part, to the use of injections of iodide of potassium.

ALLING.

DE SCHWEINITZ (718, *Metallic foreign bodies within the eye, and their removal*) demonstrates the usefulness of the roentgen rays for the localization of foreign bodies. In 15 cases the foreign bodies were accurately placed by radiography. One foreign body was in the anterior chamber, one in the lens, six in the ciliary region, nine at the equator and nine near the posterior pole. The final result as regards vision was 1.6/6, 2.6/15, 1.6/9, 6.6/6, one counting of fingers, 5 perception of light, 2 phthisis bulbi, and 8 enucleation or evisceration. In 13 of the 26 operations the point of the small magnet was introduced into the vitreous. In 6 an incision was made. In 7 the foreign body was drawn into the anterior chamber. He is of the opinion that after careful localization foreign bodies can be removed through an incision in the sclera without having to introduce the magnet into the vitreous. The results are as good as if not better than when they are drawn around the lens into the anterior chamber.

ALLING.

GIFFORD (719, *The breech-pin in Ophthalmology and Surgery*) recommends the use of a skiagram in all cases in which the eye has been injured as the result of the bursting of a gun in order that screws, bolts or other parts of the breech may not be embedded in the eye and overlooked. He reports an interesting case.

ALLING.

According to VOGL (720, *Experiments in regard to the*

chemical peculiarities of the basic aniline colors as the cause of their harmful action on the conjunctiva) the basic aniline colors are salts of mineral acids with color bases. An experimental comparison of them and of their basic aniline derivatives shows that their injurious action on the conjunctiva is to be referred to remains of phenyl in conjunction with the amido group. The injuriousness is increased by augmented basicity in the combination and still more by the introduction of alkyls in the amido group, proportionately to the number of the alkyls. The mineral acids of the basic coloring matter does not influence the injuriousness and only serves the purpose of making the coloring matter soluble in water and thereby able to act. It is also independent of the increase of the granules of benzoin in the molecules. On account of the danger from aniline colors it is best to avoid the use of them in the eye.

Poisoning by wood alcohol may produce blindness and even death as is shown by WOOD (721, *Poisoning by wood, or methyl alcohol and its preparations as a cause of death and blindness; a supplementary report*). He reports 6 cases, 2 died after drinking this preparation, 2 became blind, and 2 recovered. The symptoms of wood alcohol poisoning are abdominal pain, weakness of the extremities, and total blindness of both eyes which transiently improves and then goes on to complete loss of the power of vision.

The patient described by TUCKER [722, *A case of ocular defects associated with congenital deformity of the cranium (oxycephaly)*] was a Mahratta aged 20 with no family history of cranial deformity. He was intelligent and normal in all other respects. The measurements are given in detail and these give a cephalic index of 57.3. The palate was high and arched. Exophthalmos was increased by pressure on the lids, there was external strabismus especially of the left eye, the retinal vessels were somewhat tortuous and the movements of the eyeball were impaired in certain directions. Photographs of the patient are given. MARSHALL.

WAMSLEY (723, *The sulcus question for artificial eye*) prepares the socket for the reception of the artificial reform eye by stretching with glass balls graduated in size and replaced daily.

ALLING.

GIFFORD (724, On the clinical importance of the diplobacillus of Morax and Axenfeld) believes that, of all the germs which affect the eye, the bacillus of Morax and Axenfeld is next in importance to the pneumococcus and pus cocci. The ordinary lesion is a mild catarrhal conjunctivitis while at times there is an acute and a chronic conjunctivitis which closely resemble trachoma with roughness and swelling of the retro-tarsal folds. Occasionally serious ulcerations of the cornea are due to the diplococcus but show less disposition to spread than the more virulent forms. The germ cannot be distinguished by the microscope from Pettit's bacillus, a rarer form. The latter germ grows on agar and gelatine which it liquefies. He recommends zinc chlorid and suggests treatment of the nose as well.

ALLING.

WHEELOCK (725, Eye defects associated with the development of puberty) believes that the eyes are liable to disturbances in circulation during the period of development of the sexual function. There is a permanent limitation of the field of vision, leucocytosis and temporary loss of vision.

ALLING.

The patient of BRUNS (726, A case of inherited and acquired syphilis in the same subject) had all the characteristics of inherited syphilis and acute iritis in connection with a papillar syphilide from the acquired disease.

ALLING.

Spasmus nutans is a neurosis occurring in children between the fourth and twelfth month, characterized by movements of the head associated with nystagmus BUCHANAN (727, Two cases of spasmus nutans) from the study of two cases believes that the effort to establish binocular vision is an element in the causation. The prognosis is always good.

ALLING.

III.—REMEDIES AND INSTRUMENTS.

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RISLEY (728, Subconjunctival salt injections) favors subconjunctival injections of normal salt solution, and has never found them to be painful or to be followed by reaction. The products of inflammation overload the conjunctival and subconjunctival lymph spaces leading from the cornea and uveal tract, and it seems likely that the injections serve to dilate the spaces and hasten the lymph current thus aiding absorption and bringing fresh lymph to the affected area. The theory that osmosis plays any part in the process is probably untenable.

ALLING.

DEBECK (729, Accident with adrenalin) for cosmetic purposes instilled a 1:1000 solution of adrenalin into a congested eye which was recovering from a syphilitic iritis. About an hour later the vision became blurred, and the next morning he found the anterior chamber filled with blood. The eye perfectly recovered.

ALLING.

KÖNIGSHÖFER (730, Advances in the treatment of eye diseases) speaks first of local anaesthesia. Cocaine still holds first place, but eusemin, a mixture of cocaine and adrenalin, eucainum lacticum, yohinbinum lacticum and stovain, the last two unsuited for eyework, have been recommended. Alypin is better. For general narcosis Valude recommends chloreethyl. Trigemin is an internal analgesic. Of the silver salts protargol is the most prominent as an astringent and antiseptic with collargol, actol, ichthargan, and albargin following. Of the mercurial preparations sublamin and hermophenyl are used for general antisepsis. Oxycyanate of mercury is much used for subconjunctival injections. Hydrogen peroxide has a firm footing in the treatment of diseases of the lids and of the conjunctiva. The introduction of suprarenal preparations in the form of atrabilin, adrenalin, hemisine, suprarenin, and paranephrin has been very im-

portant. Dionin has an anaemia-producing action. In external diseases of the eye aristoloel, liquor aluminis acetici, cuprum citricum, and jequiritol have been used. In addition hot-air treatment, radiotherapy, tuberculin treatment, and serum therapy are mentioned.

According to AXENFELD (731, Experimental and clinical study of dionin as a local resorbent and analgesic in diseases of the eye) the local application of dionin to the eye causes a burning sensation and an oedematous swelling of the conjunctiva and lids. It has a marked resorptive action in chronic iritis, and in serous iritis it causes the deposits on the posterior surface of the cornea to disappear very quickly. It also has an analgesic effect.

FÖRSTER (732, Dionin and atropine) uses dionin combined with atropine in corneal ulcers and reports a satisfactory result.

CONNOR (733, Dionin in ocular therapeutics) has obtained good results from dionin in cases of fresh infiltration of the cornea, senile marginal ulcers, iritis and iridochoroiditis. Analgesia was produced in almost all cases. An inundation of lymph is caused in consequence of which resorption rapidly takes place. As yet he has met with no serious complications.

According to SNYDER (734, Physiological action of dionin) the action of dionin is purely local, through reduction of the intraocular tension and formation of oedema in the cornea.

FEJER (735, Eumydrin as a mydriatic) used eumydrin experimentally in keratitis, which was favorably influenced by a 2% solution and in iritis in a 4% solution. He observed no bad effects.

According to HUMMELSHEIM (736, The action of alypin, a new ocular anaesthetic) alypin is one of the means by which it is hoped to obtain the anaesthetic action of cocaine without its unpleasant and harmful after-effects. It is an amido-alcohol-benzoate and is dropped into the eye in a 2% solution. In its anaesthetic action there is no difference between it and cocaine. It causes a slight, very transient dilatation of the vessels. After the instillation it causes a slight burning. The size of the pupil and the accommodation are not noticeably affected by a 2% solution. No injury to the corneal epithelium was noticed after repeated applications of alypin.

IMPENS (737, Local anaesthesia with alypin) finds alypin pharmacologically a local anaesthetic of neutral reaction, freely soluble in water, which is as effective as cocaine, less poisonous, and produces no mydriasis, no disturbance of accommodation, and no contraction of the vessels.

According to NEUSTÄTTER (738, Alypin a new substitute for cocaine) the advantages possessed by alypin over cocaine are that it does not disturb the pupil, is less poisonous, and stands boiling well.

According to KÖLLNER (739, The signification of alypin for ophthalmology) a drop of a 5% solution of alypin produces an anaesthesia of the cornea sufficient for the performance of an operation and apparently greater than that produced by the same strength of cocaine. In this dose there appeared no demonstrable influence on the inner muscle of the eye, but with a larger dose combined with preparations of suprarenal capsule such an influence is usually noticeable. The peculiar constrictive action of cocaine on the vessels is absent with alypin, and this absence is noticeable in operations and in inflammations. In small doses alypin is superior to cocaine in the rapid appearance of sufficient anaesthesia and in the absence of noticeable mydriasis and disturbance of accommodation. In larger doses alypin may cause transient products of excretion in the cornea.

In alypin we have as SEIPERT (740, Alypin) believes a valuable substitute for cocaine which equals it in anaesthetic power and is to be preferred as less toxic and cheaper. STÖTZER (741, Alypin, a new anaesthetic) also considers alypin at least equally as efficient an anaesthetic as cocaine. It has no psychical influence, produces no irritation, attacks of dizziness, or congestion. According to WEIL (744, Alypin, a new local anaesthetic) alypin is a valuable substitute for cocaine and to be recommended in all cases in which a mydriasis is not needed.

Stovain has according to BRAUN (745, Some new local anaesthetics) good anaesthetic properties with a relative toxicity scarcely less than that of cocaine, but its acid solutions irritate and injure the tissue. Alypin has a very strong anaesthetic action which is greatly increased by the addition of very small quantities of suprarenin, but is markedly

irritant and injurious to the tissues. Novocain is the mono-chlorhydrate of p-aminobenzoyl-diethylaminoethenol. In connection with suprarenin it is a powerful local anaesthetic. He has observed no toxic after-effects. DANIELSEN (746, *Policlinic experiences with the new local anaesthetic novocain*) also finds novocain to be a non-irritant, rapid and powerful local anaesthetic and has observed no toxic after-effects, sign of irritation, or necrotic action. Novocain interferes in no way with the action of suprarenin and may well be sterilized. According to HEINECKE and LÄWEN (747, *Experimental and clinical studies regarding the value of novocain as a local anaesthetic*) a further advantage of novocain is that it is useful for all forms of local anaesthesia. It is as good as cocaine for infiltration and conduction anaesthesia. BIBERFELD (748, *Pharmacology of novocain*) also speaks favorably of novocain.

SCRINI (749, *The use of alkaloids in oily solutions*) favors the use of alkaloids in solutions of olive oil.

According to STEINKÜHLER (750, *Protargol*) solutions of protargol should be made with cold water and not warmed. They should always be freshly made because they easily spoil and become corrosive.

According to FORTUNATI (751, *Thigenol in ocular therapeutics*) a 5% solution of thigenol in water produces no irritation when dropped into the conjunctival sac of a healthy eye. Strong solutions and the drug itself in a pure condition induce a slight transient discomfort. He has found it very useful in eczema of the lids and in blepharitis, and of less value in acute and chronic conjunctivitis. He has also obtained good results in diseases of the lachrymal passages.

CIRINCIONE.

RE (752, *Tachiol in ocular therapeutics*) considers that tachiol has the same indications as nitrate of silver. It is better borne and less irritating than the latter. It is strongly antiseptic and in consequence of its weak caustic property has more penetrating power. It is preferable to sublimate. It is not to be recommended for the sterilization of instruments because it spoils them.

CIRINCIONE.

The use of strong antiseptics in infections of the eye is sensible only so long as the microbes are on the surface. But

as soon as they penetrate, as soon as lesions are present, the application of the ordinary antiseptics is not only useless but is to be avoided because of their injurious action on the tissue. This applies particularly to silver nitrate, but also to its substitutes, the organic silver salts and silver albuminates. GODTS (753, *Treatment of superficial ocular infections*) has used collargol for the past two years in superficial infections of the eye, less on account of its strongly antiseptic property than because it appears to strengthen the power of resistance of the organism according to the investigations of Robin. Its application is painless and unirritating, and because of its harmlessness it can be entrusted to the patient. It has given good results in acute and subacute conjunctivitis with or without purulent secretion, in ophthalmia neonatorum, in trachoma with much secretion, in corneal ulcers, and in dacryocystitis in combination with the usual probing, but not so good in the not markedly infectious diseases. It is used in instillations of a 1 or a 2% solution.

GWATHMEY (754, *The vapor method of anaesthesia*) describes an apparatus for the induction of vapor anaesthesia.

The *Innenpol-magnet* of JURNITSCHÉK (755) consists of an oval ring which contains a very great number of coils of a copper wire 1mm in diameter, enclosed in a mass which furnishes sufficient isolation for the electric current. To increase the magnetic induction the spool is enclosed in an iron mantle, while the opening differs from Haab's instrument in that it contains no iron nucleus. The middle of the ring, the opening, is placed about the head of the patient. To the lower side of the solenoid is attached a horizontal plate of hard rubber for the hand of the operator. Several pins, or styles, of soft iron of various sizes and weights accompany the instrument. After the patient has been seated and his head introduced into the ring the operator takes a style like a pencil in his hand, carries it with his hand resting on the hard rubber into the magnetic field of the opening of the spool when it becomes a strong magnet. As the head of the patient, who has the iron foreign body in the eye, is already in the spool and opposite the rod the foreign body must be magnetized and the two magnets must draw toward each other.

The modified instruments mentioned by MAGNANI (756, *Modifications of some ophthalmic instruments*) are Mellinger's blepharostat, a synechiotome, and a sickle-shaped knife for the performance of an iridotomy without emptying the anterior chamber. He also describes an electric apparatus for campimetry and a forceps for evertting the upper lid and laying bare the fornix.

CIRINCIONE.

The Refractiometer of PERLMANN (757) consists of a frame for glasses adjusted to the form of the face which contains before each eye two movable discs with lenses as in the refraction ophthalmoscope. The lenses have a diameter of 6mm. Astigmatism is determined after ascertaining the axis with a slit.

The corescope (pupillometer) of DE SUREL (758, *Clinical pupillometry*). The corescope consists of a frame in which two black threads are so arranged that they form a very acute angle with each other. The frame is passed before the eye until the two threads touch the margins of the pupil. The diameter is then to be read on the frame.

BERGER.

THOMPSON's (759, *A convenient instrument for rapid retinoscopy*) instrument consists of a light round frame in the midst of which is fastened a long handle. In the frame are twenty lenses such as are commonly used in retinoscopy. One end of the handle is held under the right arm while the frame is rotated before the eye of the patient with the left hand. Otherwise it resembles in use an optometer. It weighs nine ounces.

DEVEREUX MARSHALL.

FEILCHENFELD (760, *Fitting and adjustment of glasses*) emphasizes the fact that glasses, particularly cylinders, must have the correct position. They should be well centred and at a slight distance from the eye.

Sections IV.-VII. Reviewed by DR. ABELSDORFF, Berlin.

IV.—ANATOMY.

761. HOTTA, G. The eye of the anthropoid apes. Contribution to comparative anatomy with special reference to the musculatures of the iris. *Arch. f. Ophthalm.*, lxxii., 2, p. 250.

762. HORNICKE, PAUL. The histological formation of the lacrimal glands of the domestic animals. *Inaug.-Dissert.*, Giessen, 1905.

763. BERND, A. H. The development of the pecten from the

layers of the optic vesicle in the eye of the chicken. *Inaug. Diss.*, Bonn, 1905.

764. SCHUEPBACH. Contribution to the anatomy and physiology of the ganglion cells in the central nervous system of pigeons. *Zeitschr. f. Biologie*, xlvii., p. 439.

765. MOST. The lymph vessels and glands of the conjunctiva and lids. *Arch. f. Anatom. u. Physiol.*, 1905. Anatomical part, p. 96.

766. MATYS. The development of the lachrymal passages. *Zeitschr. f. Augenheilk.*, xiv., p. 222.

767. ABELSDORFF, G. Pigmentation of the optic nerve in animals. *Arch. f. Augenheilk.*, liii., 2, p. 185.

768. ABELSDORFF, G. The eye of the new-born kitten, with special reference to the neuro-epithelial layer of the retina. *Ibid.*, p. 257.

769. WOLFRUM. Dry celloidin. *Klin. Monatsbl. f. Augenh.*, xliii., 2, p. 61.

770. COATS, GEORGE. The structure of the membrane of Bruch and its relation to the formation of colloid excrescences. *Royal London Ophthalmic Hospital Reports*, vol. xvi., part 2.

771. LODATO GAETANO. Il tessuto elastico dell' occhio umano durante la vita fetale. *Archivio di ottalmologia*, xii., 5-6.

772. MUENCH, KARL. The innervation of the stroma cells of the iris. *Zeitschr. f. Augenheilk.*, xiv., 2, p. 130.

HOTTA (761, *The eye of the anthropoid apes*) finds that the ligamentum pectinatum of anthropoid apes is very thick as compared with that of man. Its trabeculae reach into the anterior part of the ciliary body. This deep intrusion of Fontana's space into the ciliary body causes the smallness of the root of the iris. Corresponding to the richness in pigment of the eye the ciliary muscle is permeated with numerous pigment cells. The optic nerve shows in general a feebler and more irregular development of septa than in man. The distance from the entrance of the retinal vessels in the optic nerve from the lamina cribrosa varies from 3.96 to 5.94mm, in man it is 11mm. A physiological excavation is present. Hotta claims that Fuch's peripheric atrophy of the optic nerve is to be met with in apes. Investigation of the depigmented iris showed that Bruch's membrane held no embedded nuclei. The nuclei lying on the posterior surface of the membrane were separated from it by a clear zone, corresponding to the cell body, which is broader when the pupil is dilated than when it is contracted. Bruch's membrane is also broader when the pupil is dilated. The nuclei mentioned are oval and arranged in a radiating manner when

the pupil is contracted, roundish, pressed together, and arranged irregularly when it is dilated. Bruch's membrane is only a layer of contractile substance outside of which the nucleus is placed. When the muscle layer is stretched the nuclei approach the contractile substance, and when it is greatly stretched they seem to be embedded in it. Besides Bruch's membrane and the nuclei there is only a single layer of epithelium on the posterior surface of the iris. In an ape there is no muscular dilator and a double layer of epithelium.

According to HORNICKEL (762, *The histological formation of the lachrymal glands of the domestic animals*) the lachrymal glands of sheep and goats are divided by thin interlobar bands of connective tissue which are stronger in the horse and ass, better marked in cattle, dogs, and cats and best of all in swine. Elastic tissue is only sparsely present in the glandular capsule and in the interstitial tissue. There are no muscular bands and aggregations of lymph cells, such as are to be seen in human lachrymal glands. Fat cells are numerous in the interlobar septa in cattle, swine, and dogs, moderate in number in cats, few in horses, asses, sheep, and goats.

The intercalary portions of the secretory system are present in all the animals, while the secretory ducts are usually absent. Secretory passages are intraparenchymatous and interstitial. The epithelial lining of the acini is composed of pyramidal cells, in goats of cylindrical cells. Little drops of fat are constantly present in the cells, most numerous in dogs, fewest in cats. The lachrymal glands of the horses, cattle, and cats have the character of pure albuminous, of swine of mucous, and of sheep, goats, and dogs of mixed glands. Intercellular secretory capillaries are present in swine and dogs.

BERND (763, *The development of the pecten from the layers of the optic vesicle in the eye of the chicken*) claims that the pecten in the eyes of birds is not of purely mesodermal origin, as has been supposed, but that on the seventh day of incubation the mesodermic wedge which forms the basis of the pecten is covered by an ectodermal layer. This is brought about by the portion of the layers of the optic vesicle which form the margins of the ocular fissure superposing themselves over the wedge and closing the ocular fissure.

SCHUEPBACH (764, Contribution to the anatomy and physiology of the ganglion cells in the central nervous system of pigeons) could not find in the retinæ of birds the difference between conditions of adaptation to light and dark found by Birch-Hirschfeld in the cells of the retinæ of rabbits, with special reference to the chromatin.

Most's (765, The lymph vessels and glands of the conjunctiva and lids) results obtained from injected preparations of newly born infants are as follows: the conjunctival lymph vessels pass over into those of the skin of the lid at the lid margin. The efferent lymph vessels are superficial or deep according as they arise from the skin of the lid, or from the conjunctiva. Both are divided into a lateral and a median group, of which the lateral goes to the parotid region, the median to the submaxillary. All these lymph channels lead to the deep cervical glands which adjoin the internal jugular vein, chiefly at the level of the entrance of the facial.

MATYS (766, The development of the lachrymal passages) has shown by investigations on the *Spermophilus citillus* that the commencement of the lachrymal furrow takes place in the form of an epithelial proliferation from the epiblast of the upper inner margin of the process of the superior maxilla at the place of the later conjunctiva of the lower lid. By proliferation of the epithelium a crest is formed from which as a base an epithelial cord is developed in the direction of the lower lid, later to become the lower canaliculus, and also a cord-like proliferation to the upper lid to become the upper canaliculus. The lachrymal sac arises from the epithelial cord lying between the branching of the two canaliculi. The epithelial cord lying free in the mesoblast and growing toward the nose is the future nasolachrymal duct. After all parts of the lachrymal apparatus have been commenced they are shoved by the further development of the superior maxilla toward the inner canthus until they are placed in their proper position. A lumen appears first in the lower canaliculus, which is much thicker than the upper. The lachrymal gland arises from the epithelium of the conjunctiva of the upper lid; Harder's glands appear somewhat later. The primary commencement therefore corresponds to the lachrymal sac, from which the canaliculi and lachrymal duct develop secondarily.

ABELSDORFF (767, *Pigmentation of the optic nerve in animals*) notes that beside the pigmentation of the optic nerve in animals pictured by Ogawa there is a form which affects only the nerve head.

ABELSDORFF (768, *The eye of the new-born kitten, with special reference to the neuro-epithelial layer of the retina*) starts from the fact that the pupils of newly born kittens react to light. This is little in accord with the statement of Max Schultze that the retinae of these animals contain no rods or cones. Microscopic examination showed that a zone free from rods and cones is present only in the periphery of the retina, that rudimentary rods are present in the posterior parts of the eye, but that a little central zone exists which contains clearly distinguishable rods and cones.

WOLFRUM (769, *Dry celloidin*) recommends for the preparation of thin celloidin sections to place the celloidin preparation hardened in chloroform vapor in equal parts of chloroform and cedar oil and after evaporation of the chloroform to cut the transparent preparation dry.

According to COATS (770, *The structure of the membrane of Bruch, and its relation to the formation of colloid excrescences*) the histological details of the colloid excrescences on the membrane of Bruch have been fairly well described, but there is still wanting a satisfactory explanation of their origin. There are two principal theories: (1) the transformation theory, according to which they are caused by a transformation of the pigment epithelium, and (2) the deposition theory according to which they result from an excretion of the pigment cells without any true transformation of the latter. Coats shows that Bruch's membrane, which appears homogeneous when stained with eosin, can be separated by a special staining into two layers, which indicates a separate origin for each. The fine elastic fibres in the outer layer are similar to the elastic fibres in the neighboring choroid and must have the same origin, while the inner homogeneous layer looks like a central product that originated from the pigment epithelium. It is very probable that the colloid excrescences arise only from the inner layer. This is also shown in sections colored with Weigert's elastic-tissue stain. Coats finally speaks in favor of the deposition theory, although both theories pre-

suppose an abnormal transformation of the pigment epithelium. A historical résumé of our knowledge of the anatomy of the colloid bodies and an exhaustive collation of the literature on the subject are given. DEVEREUX MARSHALL.

According to LODATO (771, *Il tessuto elastico dell' occhio umano durante la vita fetale*) the elastic tissue appears in the lid after the second month. The tarsus is richly furnished with elastic fibres. In the bulbar conjunctiva the elastic fibres appear between the second and third months. The conjunctival fornix receives its elastic fibres from the lids. They appear in the anterior section of the uvea in the course of the third month, and supply the entire capsulo-pupillary membrane, the vascular tunic of the lens, the angle of the anterior chamber, and the ciliary muscle. The iris contains no elastic constituents. In the deeper parts of the cornea the fibrillæ are more apparent and extend into the sclera. In the ciliary processes they are more numerous and extend into the processes themselves. Schlemm's canal is invested by elastic tissue in an embryo of eight months, the iris is still without fibres and Descemet's membrane appears as a thin strip. The elastic tissue in the iris develops after birth. The cornea appears to be wanting in elastic constituents. The elastic tissue appears in the sclera and choroid in the course of the third month. In the optic nerve the elastic constituents first appear in the fourth month in the sheath. Between the fifth and sixth months elastic fibres penetrate from the sclera, and later these unite with fibrillæ coming from the choroid and vessels to form the lamina cribrosa. In the lachrymal gland the absence was demonstrated of the intra-tubular elastic tissue which is present in adults.

CIRINCIONE.

MUENCH (772, *The innervation of the stroma cells of the iris*) distinguishes two types of cells in the iris, the stroma cells pigmented and with strong processes, and non-pigmented, small, roundish cells, poor in protoplasm and with large nuclei. The second type of cells the author denominated ganglion cells of the primitive type because he thinks they form nodal points of a fibrillary network which is a net of nerve fibres. These nerve fibres unite with the stroma cells (1) in a single contact, (2) in a way analogous to Ranvier's "taches notrices,"

(3) when a ganglion cell, adjacent to the stroma cell, itself forms the terminal swelling.

V.—PHYSIOLOGY.

773. FRANK, M. Observations regarding the conformity of Hering-Hildebrand's declination of the horopter and Kundt's division experiment. *Pflueger's Arch. f. d. ges. Physiol.*, 109, p. 63.
774. HESS, C. Physiology and anatomy of the eyes of the cephalopods. *Ibid.*, 109, p. 393.
775. SIVEN, V. O. The retinal rods and cones as the medium for the reception of color impressions. *Skandinav. Arch. f. Physiol.*, xvii., p. 306.
776. PIPER, H. The electromotor behavior of the retina in warm-blooded animals. *Arch. f. Anat. u. Physiol. Physiol. Abth.*, sup. p. 133.
777. HERZOG, H. Experimental studies of the physiology of the movements in the retina. *Ibid.*, p. 413.
778. DANILEWSKY. Observations of a subjective light impression in variable magnetic fields. *Ibid.*, p. 513.
779. STIGLER, R. Entoptic perception of the retinal vessels. *Zeitschr. f. Psychol. u. Physiol. d. Sinnesorg.*, 39, 4-5, p. 327.
780. GESZA, REVESZ. Is the sensitiveness of an eye to light changed by a simultaneous irritation of the other eye by light? *Ibid.*, p. 314.
781. STIGLER, R. A new subjective optical phenomenon. *Ibid.*, p. 322.
782. LORIA, STANISLAW. Investigations of peripheral vision. *Ibid.*, 40, 3, p. 160.
783. LOHMANN, W. The emulation of the visual fields and its significance in plastic vision. *Ibid.*, p. 187.
784. WESSELY, K. The fluids and metabolism of the eye, with special reference to its relation to general physiologic and biologic questions. *Ergebnisse der Physiologie*, iv., p. 565.
785. TSCHERMAK, A. The bases of optic localization according to height and breadth. *Ibid.*, p. 517.
786. ELSCHNIG. Monocular stereoscopy and direct stereoscopic projection. *Jahrbuch f. Photograph. u. Reproductionstechn. f. d. Jahr*, 1905.
787. TROMP, FRITZ. The physiology of the motion of the iris. *Inaug-Dissert.*, Marburg, 1905.
788. WEINHOLD. A phenomenon of accommodation to be observed with the aid of a stenopaic slit. *Klin. Monatsbl. f. Augenheilk.*, xliii., 267.
789. HAMBURGER, C. Observations on the theory of direct vision. *Ibid.*, Beilageheft, p. 106.
790. HEINE, L. Perception and conception of differences of distance. *Arch. f. Ophthalm.*, lxi., 3, p. 484.
791. WOELFFLIN, E. The influence of age on the light sense of the eye adapted to the dark. *Ibid.*, p. 524.

792. STERN, ROBERT. Visual purple fixation. *Ibid.*, p. 561.
793. SCHREIBER, L. New observations regarding the pupillary reflex after section of the optic nerve in rabbits. *Ibid.*, p. 570.
794. GULLSTRAND, A. The color of the macula centralis retinæ. *Ibid.*, lxii., 1, p. 1. Also lxii., 2, p. 378.
795. LEBER, ALFRED TH. The metabolism of the crystalline lens. *Ibid.*, liii., 1, p. 85.
796. POLACK, A. Simultaneous contrast of colors. *Compt. Rendu de l'Academie des Sciences de Paris*, July, 1905.
797. NUEL, JUN. The molecular concentration of the intraocular fluids in the normal and pathological states. *Soc. Belge d'ophthal.*, June 11, 1905.
798. AGADSCIARIANZ. The cortical visual centre. *Obosren Psychiatr. i. Neurolog.*, 1904, 6.
799. COLLINS, E. TREACHER. On the development of the accommodative power of the human lens. *Royal London Ophth. Hosp. Reports*, xvi., part 2.
800. OVIO, G. Movimenti pupillari, intensità luminosa, accomodazione. *Annali di ottalmologia*, 1905, 102-146.
801. RE, F. Sulle modificazioni fisiche e chimiche della retina per l'eccitazione elettrica dell' encefalo, mesencefalo e chiasma. *Archivio di ottalmologia*, xii., 3-4.

According to E. HERING (773, Observations regarding the conformity of Hering-Hildebrand's declination of the horopter and Kuhnt's division experiment) on placing plumb lines in an apparent plane this is brought in near vision into a cylindrical surface slightly concave toward the observer. From this taken as the empirical determination of the longitudinal horopter Hering concludes that the corresponding retinal elements do not lie exactly congruent, but that the separation of the elements is less on the temporal side of the retina than on the nasal. Kuhnt's division experiment supports this declination of the horopter. If a horizontal distance is halved and one eye only is fixed on the middle point the outer half appears somewhat greater than the inner. Frank has demonstrated the conformity of this declination of the horopter with Kuhnt's experiment by experiments under the same conditions. Three black hairs with weights are so placed that they appear to the observer as three fine black lines equally far apart on a white surface and remove the empirical motive for the localization of depth from the experimenter 30 or 40cm distant. In the first, binocular, experiments the three hairs were so placed that they appeared equidistant.

in one and the same frontal plane (empirical longitudinal horopter), in the second, monocular, experiments a lateral thread was moved to the same apparent distance from the fixed middle thread as the other lateral thread which was also fixed in position. The results of both showed the incongruence in favor of the nasal part of the retina. The author sees in this demonstration a basal argument in favor of the subjective physiology of sense.

HESS (774, *Physiology and anatomy of the eyes of the cephalopods*) claims that the retina of a cephalopod contains a highly light receptive coloring matter resembling the visual purple of vertebrates. He overcame the difficulty met with in investigation of the visual purple in cephalopods through the presence of pigment in the layer of rods in various ways. Like the visual purple of vertebrates it is not materially injured by post-mortem changes, but unlike the former is changed by the prolonged action of alum. Sodium taurocholate dissolved the rods, but solutions of the purple could not be made because of the great mixture with pigment.

The pigment changes in the eyes of cephalopods usually take place in this manner: on illumination, first the pigment in the lower, then in the peripheral parts of the upper, portion of the retina move forward, so that the middle may appear as a bright gray strip with dark surroundings. The migration of the pigment follows over the inner surface of the retina to its contact with the hyaloid. Within the retinal strip of clearest vision, where the rods are longer and finer than in its neighborhood, the migration of the pigment in the light is slower, and its return in darkness quicker than in the rest of the retina.

SIVEN (775, *The retinal rods and cones as the medium for the reception of color impressions*) does not ascribe exclusively colorless impressions to the rods, although in a faint light light perception seems to be the only function of the rods, because with a stronger illumination color impressions are made by the short-waved rays. The author finds support for this theory in the appearance of the slightly illuminated spectrum, the width of the visual field for different colors, Purkinje's phenomenon, the blue blindness of hemeralopes, the violet blindness and greenish yellow vision with the ex-

clusion of the macula region in santonin poisoning, and in the fact that he cannot perceive spectral violet by foveal observation. The cause of the slight receptivity of the retinal centre for short-waved light the author considers not to be absorption through the pigment of the macula because this is not present, the yellow staining of the macula being according to Gullstrand a cadaveric sign. He ascribes the violet blindness of the macula rather to the slight sensitiveness of the cones to light of short waves and the absence of rods in this place. He ascribes to the cones the special perception of long waves of light and their complementary colors and calls them the red-green perceiving apparatus. The rods he calls the blue-yellow perceiving apparatus as they specially receive impressions from light of short waves and their complementary colors. Perception of white is due to both the rods and the cones, while that of black is not a perception in the true sense, but a simple recognition of deficiency.

PIPER (776, *The electromotor behavior of the retina in warm-blooded animals*) has investigated the direction and time of the electric retinal current and also measured the relative stimulant values of homogeneous lights by the electromotor force. He used a Deprey d'Arsonval galvanometer to determine the direction of the current as well as the values of homogeneous lights coming from the dispersion spectrum of a Nernst light, and a capillary electrometer for the registration of the proportionate variations of the current and to determine the latent stage. The curarized animals were placed in a dark box with a fissure covered with ground glass for the entrance of the light employed. The experiments were performed on day birds—buzzards, hens, and pigeons; night birds—owls, dogs, cats, and rabbits. The electromotor reaction of the retina to the exposure appeared in the form of a positive variation of the dark current from the cornea to the posterior pole of the eye. The positive variation is to be considered the normal reaction to exposure to the rays. In injured eyes the transition from the positive to the negative variation is to be observed, and the rapid subsidence of the electromotor force is also to be seen in the retinal cones of buzzards and pigeons, which possibly are particularly sensitive to the influence. The period of latency between the moment of stimu-

lation and the beginning of the photo-electric reaction is in birds from $2/100$ to $3/100$ of a second, in mammals about twice as long. It is markedly prolonged by injurious influences. Judging from this it would appear that the seat of the photo-electric process is in the sensitive epithelium of the retina. The retinal reaction to darkness showed a negative variation, instead of positive as in frogs, and from this the original value of the dark current was obtained. There was a characteristic difference between the values of the currents obtained through homogeneous lights in day and night birds. The maximal value appeared in the retinas of day birds on stimulation with the long-waved rays of the Nernst light spectrum and was markedly less on stimulation with the green and blue rays, while in night birds the green rays excited the maximal activity and the long-waved rays had relatively less effect. The curve of the stimulant value for the rods of night birds coincides with the absorption curve of the visual purple. No modification of the relative stimulant value of homogeneous lights in the sense of light and dark adaptation was shown. Yet the rods of the night birds were more suited to a condition of increased sensitiveness in the dark than the retinal cones of the day birds through the increase in reaction. In mammals the division of the electro-motor stimulant values of spectral lights corresponded with that found in birds. It was independent of changes of conditions of adaptation of the retina and of the strength of stimulation, and showed the division of "dusk value" known in human physiology. The author gives the explanation that the animals under investigation have relatively few cones, that the electrodes adjoined the peripheric regions which are poor in cones, and the tapetum favored the action of green light.

HERZOG's (777, *Experimental studies of the physiology of the movements in the retina*) experiments were performed entirely on frogs. In addition to the known retinomotor influences of light and darkness the following was learned. Destruction of the brain and spinal cord brought about the maximal light position of the cones, so the author postulates for the myoid of the cones a tonus emanating from the central nervous system. Warmth and refrigeration act alike. Temperatures

of from 21° to 32° C. cause the same as one of 0° advance of the pigment and contraction of the cones, and perhaps the latter hastens the former. Also after the conclusion of the refrigeration the movement increases and reaches its maximum an hour later. The prolonged tying up of a frog has the same influence on the cone and pigment movement as cold, warmth, and light. In a second series of experiments the influence of the time, intensity, and quality of the exposure was determined. An exposure of moderate intensity for about $2\frac{1}{2}$ minutes was necessary to induce the maximum contraction of the cones, while momentary illumination or exposure for half a minute produced no recognizable effect. Exposure to red, green, and blue rays produced with an increasing intensity an increase in the contraction of the cones. Blue violet rays produced a higher degree of contraction than red in the same time and the same or weaker intensity of exposure.

DANILEWSKY (778, *Observations of a subjective light impression in variable magnetic fields*) confirms the observation made by E. K. Mueller, that a fluttering appears in the periphery of the visual field in the form of concentric, wavelike light movements in a strongly variable magnetic field in the open eye which has been brought sufficiently near the radiator. He believes that the cause of the light perception lies in the magnetic energy, while perhaps a clonic contraction of the ciliary muscle and an intermittent mechanical dragging on the peripheral portions of the retina may be produced by the induced stimulation.

STIGLER (779, *Entoptic perception of the retinal vessels*) looked upward beneath the closed lids, the eyes turned toward a source of light, drew the lower lid down so as to uncover a part of the pupil, and then saw the shadow of his own retinal vessels which quickly disappeared. He also saw the figure of the veins when with one eye closed he looked with the other at the bright sky and made pressure at the outer or inner canthus on the open eye synchronously with the beat of the heart, pressing with the systole and removing the pressure with the diastole. A third method consisted in turning both closed eyes toward a light, covering one with the hand, and making a slight pressure upon this at the outer canthus. The vessels, particularly those about the fovea,

appear then as yellow on a black ground. The mechanical irritation of the obstructed vessels makes them visible in the dull light.

The experiments undertaken by REVESZ (780, *Is the sensitiveness of an eye to light changed by a simultaneous irritation of the other eye by light?*) allowed light to be conveyed to the two eyes independently of each other. After maximal adaptation to the dark the liminal value of one eye would be fixed with the other eye kept in darkness and then redetermined when the second eye was stimulated by a certain intensity of light. The results did not show that the liminal value in the one eye underwent any legitimate change from the action of light stimulation of the other, and a relation between the conditions of stimulation of the two eyes was not demonstrable.

STIGLER (781, *New subjective optical phenomenon*) observed the following phenomenon when the resting eye had been subjected for some time to not dazzling daylight the intensity of which was suddenly diminished. An impression of the retinal vessels appeared over the entire field of vision as a delicate silvery network with polygonal meshes and dark, arch-shaped bands in the periphery. Without going into the anatomical basis of this phenomenon, the author thinks it probable that the functional hyperæmia of the vessels caused by the stimulation of light plays a part in its origin.

LORIA's (782, *Investigations of peripheral vision*) investigations follow the observations of Heinrich that the accommodation changes in contemplation of peripheral objects although the distance to them remains the same as that to the central object. Loria finds that the accommodation of the eye to paraxial distances is dependent on the position of the object and independent of the distance of the central point of fixation. He also finds that the eye is very myopic paraxially and that the myopia increases with the angle of the paraxial position. The accommodation decreases with the angle of the paraxial position. All axial and paraxial objects which lie in different points in a line of accommodation are simultaneously clearly visible, but the author adds that not all objects are equally clearly visible, because the objects in the periphery are inferior in clearness to those in the centre.

In the so-called emulation of the visual fields there is according to LOHMANN (783, *The emulation of the visual fields and its significance in plastic vision*) a difference between the fixation point and the periphery. In the fixation point appear two different objects presented by the individual eyes under and through each other, while in peripheral vision one image yields to the other. This property of the emulation takes part in plastic vision as in addition to the impression of the place of clearest vision which is about the fixation point in both fields the phenomena of the parallel axis are called forth and the impression of materiality made.

WESSELY's (784, *The fluids and metabolism of the eye with special reference to its relation to general physiologic and biologic questions*) article is under two heads: (1) the relations of the intraocular fluid changes to the general theory of secretion and absorption; (2) the relations of the nutrition of the transparent tissue of the eye to the general nutrition.

TSCHERMAK (785, *The bases of optic localization according to height and breadth*) gives an analysis in which he rests upon subjective methods of observation. The retinal incongruences *i. e.*, the contradictions between the geometrical position and the local signs of the individual retinal elements are divided into discrepancies of distance and direction. Their explanation carries Tschermak to the perception that the retinal elements physiologically have the sense of form but not of size. The labyrinth has an associated influence on the sometimes changing value of the retinal vertical or horizontal meridians. Though the eye muscles cause no consciousness of the position of our eyes yet they are not lacking in a sensory part, because the quality "apparently directly in front" is connected with symmetric convergence and "apparently at the height of the eyes" with a certain moderate lowering of the visual plane. A congenital basis is postulated for these physiological factors which belong to both binocular and monocular localization from height and breadth.

ELSCHNIG (786, *Monocular stereoscopy and direct stereoscopic projection*) describes the stroboscopic phenomena simultaneously found by Straub and Brown which call forth an apparent monocular stereoscopic vision. He emphasizes

that stereoscopic vision by means of simulated parallel axes is only simulated, as this stereoscopy very often clearly inverts itself and accordingly is to be classed with optical illusions. Good kinematographic pictures simulate stereoscopic vision, but will not stand comparison with true stereoscopic pictures.

WEINHOLD (788, *A phenomenon of accommodation to be observed with the aid of a stenopaic slit*) says that objects seen through a stenopaic slit appear smaller than they should at a certain distance under strong accommodation, and larger when the accommodation is relaxed. A lateral movement of the slit causes a parallactic movement of the object in the same direction as the slit when the eye is strongly accommodated, in the opposite direction when the accommodation is relaxed. He explains these movements by the change in position of the cardinal points of the eye during accommodation.

HAMBURGER (789, *Observations on the theory of direct vision*) says that after-images totally invert themselves when after fixation of a suitable object one tries to make them. Although this phenomenon is easily explainable by the projection theory it is incompatible with Aubert's phenomenon. The projection theory is strikingly gainsaid by Stratton's experiment in which after closure of one eye upright images are produced on the retina of the other eye by a pair of suitable lenses and after a few days the objects appear no longer inverted but upright. That infants do not see objects at first inverted and learn to see them upright by experience was shown by experiments on animals. Guinea-pigs and chickens born and kept for several days in the dark were able without practice to roam about without making errors. When the writer finds strange the recently advanced view that the problem of upright vision in spite of inverted retinal images is no problem at all, the words of Berkeley in the beginning of the eighteenth century may be recalled: "we imagine ourselves looking on the fundus of another's eye" when we speak of the problem of the inverted retinal image.

HEINE (790, *Perception and conception of differences of distance*) found (1) in an absolutely dark room the difference in distance of two punctate objects placed one nearer than

the other was correctly perceived with binocular vision on momentary illumination. (2) This difference was not perceived monocularly but was obtained by prolonged observation and lateral movements of the head or body through the parallactic motion. The conception thus obtained may be erroneous. While the binocular perception of differences of distance is a simple centripetal process of the senses without presupposition, the monocular recognition of differences of distance by lateral movements of the head or body is made under the supposition that the objects remain still and the condition of known change in the position of our standpoint. Among such conceptions belong the recognition of differences of level in the fundus with the aid of the parallactic motion in the upright and inverted images. That this conception is not infallible is shown by the fact that the glaucomatous papilla was at first thought to be prominent because of its parallactic motion in the inverted image. The stroboscopic apparent movements termed by Straub monocular stereoscopic, *i. e.*, monocular stereoscopic vision in the stroboscope, he considers an illusion. The apparent movements of stereoscopic pictures he considers psychical if produced by the voluntary change of standpoint of the observer, and partly at least explainable geometrically when due to the turning of the picture itself.

WOELFFLIN (791, *The influence of age on the light sense of the eye adapted to the dark*) examined 100 persons from 20 to 70 years of age with healthy eyes adapted to the dark. After half an hour in a dark room he determined the minimal light stimulus with the aid of ground glasses and a diaphragm in the intensity of various sources of light. The average value showed that a true influence on adaptation could not be ascribed to age. There was no difference between the most sensitive places in the upper and lower parts of the retina. The liminal value was not increased in myopes. Adaptation was very slow in blondes, very quick in brunettes with greater sensitiveness to light. He did not confirm Piper's statement that the binocular light perceptive value is double the monocular.

STERN (792, *Visual purple fixation*) recommends in order to study the visual purple in microscopic sections to fix the

retina in a 25% platinic chloride solution and embed in paraffin. The outer ends of the purple holding rods are then stained orange, while rods from clear eyes are colorless. The stain is almost insensitive to light.

SCHREIBER (793, *New observations regarding the pupillary reflex after section of the optic nerve in rabbits*) does not confirm Marenghi's statement that the reaction of the pupil to light is preserved in rabbits after intracranial section of the optic nerve, but he found the following reflex. In 26 rabbits the optic nerve was divided, in 3 intracranially. In these 3 and in 9 in which it was divided in the orbit when the rabbits were energetically seized by the roots of the ears the pupils of the affected eyes underwent a distinct though slow contraction. In all the eyes which showed this ear-pupillary reflex irritation of the cornea, passive opening and closing of the eyes and luxation of the globe induced a contraction of the sphincter iridis, which was in no way connected with a reaction to light. The maximal dilatation of the previously contracted pupil could be obtained in rabbits with divided optic nerves by slapping the abdomen with the open hand.

GULLSTRAND's (794, *The color of the macula centralis retinæ*) demonstrations that the macula lutea is a cadaveric appearance and that in the living eye there is no yellow coloring matter in the layers of the central part of the retina in front of the membrana limitans externa are of a threefold nature.

1. Ophthalmoscopic observation: The physical conditions for the visibility in the living eye of the supposed yellow color are just as favorable as in the cadaveric opacity of the retina if one examines strongly pigmented eyes with daylight, or with a light which contains no red rays but is very strong in the yellow portion of the spectrum, yet no trace of color is perceptible, and none in fresh cases of acute ischæmia of the retina.

2. Entoptic investigations and color mixtures: The entoptic picture of the macula is separated by parallax from that of the fovea and the origin of the former is shown to be in the layer of sensory epithelium, that of the latter to be on the membrana limitans interna. Both in monochromatic and in mixed lights the macula appears entoptically as blue on a green ground, an appearance which cannot depend on

absorption by a yellow pigment. Haidinger's polarization bundles cannot be explained by double refraction on Mueller's base fibres saturated with yellow coloring matter, because then the polarization bundles must at least show the same parallactic motion as the deepest lying capillaries, but if they show no such motion, their cause is to be sought in the layer of sensory epithelium. A quantitative investigation shows a power of absorption of the terminal light at the macula difficult to reconcile with the presence of a yellow pigment. Further the determination of the complementary colors for an unchangeable, reproducible white light gives a true difference for small and large fields. The physical explanation of these things does not favor the theory of a special coloring matter.

3. Anatomical investigation: The yellow color of the macula centralis retinae in the enucleated eye is a cadaveric appearance which is produced by the tearing off of the epithelial processes, or the separation of the same by fluid imbibed by the retina. When the loosening of the retina has taken place without any force, no trace of the typical cadaveric macula is to be found.

LEBER's (795, *The metabolism of the crystalline lens*) investigations regarding the entrance of inorganic and organic substances into the lens were made in living animals in this way: The lenses of oxen were placed in equimolecular solutions of the various substances, removed from the same at corresponding intervals, washed with isotonic salt solutions, frozen and examined chemically, the cortex and nucleus separately. Of the inorganic salts chloride of lithium penetrated the most easily, then followed potassic iodide, sodic iodide, manganese chloride, rhodanammonium, and finally potassic ferrocyanide. The organic substances exhibited considerable differences in their behavior. Of the carbohydrates glycogen did not enter the lens at all and there was no deep penetration of amylodextrin after 12 hours. Grape sugar entered the lens with ease. Cane sugar in small quantity during the first 12 hours, more rapidly in the succeeding 12 hours. Of the albuminous bodies hemoglobin penetrated only the outermost layer of the cortical, pepton did not enter at all, while gluten entered clearly. Isotonic solutions of fluorescin, indigo,

carmine, etc., showed that the lens possesses little or no diffusion power. Certain fatty solvents, such as chloroform, phenol, aceton, and anilin, quickly penetrate into the central part of the lens, while the likewise fatty solvent naphthaline and β -naphthol do not.

The author suggests the possibility that the senile lens, because it contains an increased amount of lecithin, cholesterin and other lipoids, is more fitted for the admission of fatty solvent substances in metabolism and that these substances become of consequence in the origin of senile cataract.

POLACK (796, *Simultaneous contrast of colors*) traces the appearance of simultaneous color contrasts to the chromatic aberration of the eye. They cannot be explained as after images because their perception requires an illumination which lasts only 0.1 of a second.

BERGER.

NUEL (797, *The molecular concentration of the intraocular fluids in the normal and pathological states*) investigated the molecular concentration of the intraocular fluids in normal and pathological conditions, using Hamburger's method of hemolysis. He found it about the same as that of the blood serum, or but little weaker. In two glaucomatous eyes it was a little less than that of the blood serum. Consequently in these cases the hydrostatic hypertony of the eye cannot be the result of a preponderance of the osmotic pressure of the intraocular fluids over that of the blood plasma. Demarest obtained the same result from an examination of two glaucomatous eyes in 1904, and therefore the theory of glaucoma which ascribes the increased intraocular tension to increased osmosis is incorrect.

BERGER.

According to AGADSCHARIANZ (798, *The cortical visual centre*) the visual centre is situated on the inner side of the occipital lobe and the centre of clear vision in front of the centre corresponding to the rest of the retina. These two centres can be affected separately. In organic affections of the cortex the eye becomes at once blind to all colors. Organic affection of the cortex do not produce complete blindness either on the affected or on the opposite side, at least in dogs, apes, and man.

HIRSCHMANN.

As Helmholtz has shown, the power of accommodation of

the lens is through the elastic fibres which are in a state of tension. By a relaxation of this tension an increase of the curvature of the surface of the lens is produced. TREACHER COLLINS (799, *On the development of the accommodative power of the human lens*) shows how this condition of tension is developed. He shows that different parts of the ciliary body come in contact at different times during its development with the lateral portions of the lens and that adhesions between them must take place at different times. With the growth of the eye the ciliary body becomes removed from the lens and this causes a tension on the fibres and a marked pull on the capsule. A part of the fibres try to draw the capsule forward and outward, another part backward and outward. The effect on the elastic fibres of the lens is that they become more and more bent and remain in a state of tension.

DEVEREUX MARSHALL.

Ovio (800, *Pupillary movements and luminous intensity*) has undertaken to solve the complicated problem of the existence of a relation between the diameter of the pupil and the intensity of the light. From the classical researches of Lambert he deduces the law that the increase of the pupillary surface in relation to its initial surface is inversely proportional to the square root of the light strength. Like Lambert the author used daylight in his experiments. He arrived at the following conclusions. The variations of the pupillary surface from the initial surface are inversely proportional to the square root of the light strength. The pupillary variations are not uniform for uniform variations in the light strength, but gradually become slower as the intensity is increased. Within certain limits the pupillary reaction depends exclusively upon the quantity of light which strikes the retina whether applied to a small, or scattered over a large surface. The same quantity of light produces a greater reaction when it falls on the central part of the retina than when it falls on the peripheral part. The pupillary variations from accommodation are not proportionate to the light strength, yet are modified by it. If the pupil is acted upon simultaneously by light and accommodation the latter predominates so that the pupil is small even with weak illumination. There is no true relation between troubles of the

accommodation and the pupillary changes; nevertheless the corresponding pupillary surfaces are in constant proportion to each other in consequence of equal variations of accommodation. The pupils react to isolated accommodation, not accompanied by convergence of the visual axes, and also to isolated convergence, not accompanied by accommodation. The reaction to convergence appears to be greater than that to accommodation.

Starting from the existence of centrifugal fibres in the optic nerve, RE (801, *Sulle modificazioni fisiche e chimiche della retina per l'eccitazione elettrica dell' encefalo, mesencefalo e chiasma*) has tried to show the behavior of the periphery during electric excitation of the centre. He found that electric excitation of the cortex of the posterior lobe produced no reaction in the retina. Electric excitation of the optic lobe caused a reaction. Direct excitation of the chiasm induced a complete reaction. By a second series of experiments he found that the electric excitation of the chiasm produced a greater acidity of the retina than excitation of the optic lobe, that excitation of the optic lobe produced a greater acidity of the retina than excitation of the cortex, and that excitation of the cortex induced no reaction different from those observed in the retinæ of the animals used as controls.

CIRINCIONE.

VI.—REFRACTION AND ACCOMMODATION.

- 802. THORNER, W. The operation for high myopia. *Charité-Annalen*, xxix.
- 803. FEILCHENFELD, H. The stereoscopic accessory action of cylindric glasses placed with symmetrical axes. *Arch. f. Augenh.*, liii., 1, p. 57.
- 804. WEIDLICH, J. The relations of diffuse opacities of the transparent media of the eye and irregular astigmatism to differences in the reduction of vision for objects placed at different distances. *Ibid.*, liii., 2, p. 174.
- 805. SCHWARZ, O. Diagnosis of latent paresis of the accommodation. *Ibid.*, p. 363.
- 806. STILLING, J. Anatomy of the myopic eye. *Zeitsch. f. Augenheilk.*, xiv., 1, p. 23.
- 807. HAMBURGER, C. Stilling's theory and how its author defends it. *Ophthalmolog. Klinik*, Nos. 18 and 19.
- 808. WEINHOLD, M., Theory of sciascopic shadow rotation in astigmatism. *Arch. f. Ophthalm.*, lxii., 2, p. 275.

809. HUBER, F. Late results of the myopia operation. *Beitrag zur Augenheilk.*, 64, p. 1.
810. OTTE, A. Clinical and statistical contributions to the study of myopia. *Inaug. Dissert.*, Giessen, 1905.
811. FRENKEL, H. Traumatic myopia. *Annales d'oculistique*, cxxxiv., 1.
812. VACHER and BAILLART. Second note in regard to the influence of the total correction of the myopia over its progression and over detachment of the retina. *Ibid.*, p. 330.
813. NUEL. Etiology and pathogeny of certain irregular astigmatisms of the lens. *Revue générale d'ophthalmologie*, xxiv., p. 337.
814. BARNES, J. L. Removal of the lens in myopia. *Medical Record*, June 17, 1905.
815. CLAIBORNE, J. H. The axis of astigmatism. *Jour. of the Amer. Med. Assn.*, Feb. 4, 1905.
816. BLACK, N. M. The relation of the curvature of the cornea to the refraction. *Ibid.*, Feb. 4, 1905.
817. PERCIVAL, A. S. Correction of astigmatism by tilting lenses. *Ophthalmoscope*, June, 1905.
818. GOULD, G. M. The etiology of astigmatism. *Annals of Ophthalm.*, July, 1905.
819. EATON, F. B. Experimental and clinical evidence of dynamic (spastic) astigmatism. *Jour. Amer. Med. Assn.*, Aug. 26, 1905.
820. BRUNS, H. D. Change in astigmatism produced by chalazion. *Ophthalmic Record*, Sept., 1905.
821. CHIARI, C. Contributo allo studio delle modificazioni delle curve corneali in rapporto alle contrazioni dei muscoli. *Annali di ottalm.*, XXXIV., p. 286.
822. DE LIETO VOLLARO. Agostino, Contributo all'esame della rifrazione oculare per mezzo del punto luminoso. *Arch. di ottalm.*, xii., ii., 9-10.

THORNER (802, Operation for high myopia) reports 17 cases of operation for myopia. In 9 he obtained a bad result. Detachment of the retina occurred 5 times, in one the patient had detachment in the non-operated eye, in one case of seclusion and occlusion of the pupil there was probably a detachment before operation, in one phthisis bulbi resulted from a purulent infection, and in one vision was reduced to movements of the hand by a central choroiditis. The particularly unfavorable results are explained by the fact that the cases were retained under treatment at the Berliner Charité and in part of them the complications first appeared years after the operation. Thorner concludes that the danger of detachment of the retina is increased by the operation and thinks that very myopic eyes are so injured in their nutritive

conditions that germs of infection find in them more favorable media than after ordinary cataract extraction. The operation should be confined to patients who are unable to do their work even with the aid of correcting lenses.

FEILCHIENFELD (803, *The stereoscopic accessory action of cylindric glasses placed with symmetrical axes*) speaks of cylindric glasses placed with oblique axes to correct the corresponding astigmatism. When the axes are directed from above and inward, downward, and outward, or the reverse, with concave cylinders, the ground seems to rise or fall. This is because not exactly corresponding places on the two retinæ are affected and the image is distorted because increased or diminished in size by the cylinders in two meridians perpendicular to each other. As the distortion is greatest at 45° the author recommends that when strong cylinders of 45° are needed the axes should be brought nearer the horizontal for convex glasses, nearer the vertical for concave. Aside from this, cylindric glasses should be brought as close as possible and carefully centred in order to avoid distortion of the image.

WEIDLICH (804, *The relations of diffuse opacities of the transparent media of the eye and irregular astigmatism to differences in the reduction of vision for objects placed at different distances*) says that with diffuse opacities and irregular astigmatism various circumstances combine to make distant vision appear relatively less than near. In near vision the distance of the nodal point from the retina increases the size of the retinal pictures. As relatively less light enters the eye from more distant light points the diminished light intensity must be equalized by enlargement of the image.

SCHWARZ (805, *Diagnosis of latent paresis of the accommodation*) recommends for the detection of monolateral latent paresis of the accommodation that each eye should fix on a certain object in turn while in turn each eye is covered. When the paretic eye undertakes to fix, the increased accommodative effort induces a contraction of the pupil of the sound eye which yields to a dilatation when the sound eye fixes.

The measurements made by STILLING (806, *Anatomy of the myopic eye*) on an eye myopic about 4 D., an emmetropic eye, and an eye hypermetropic 2 D., showed that the sclera of the non-myopic eyes was thinner than that of the myopic. The

examination of 6 myopic eyes, the length of which deviated only slightly from the normal, showed that the sclera increased in thickness from the equator toward the pole. Stilling believes that myopic eyes are large normal eyes the length of which has been increased by the muscle pressure; whether they are myopic depends on the curvature of the cornea. The thickness of the sclera he thinks has nothing to do with the development of myopia during near-work.

HAMBURGER (807, Stilling's theory and how its author defends it) again points out the inaccuracy of Stilling's orbital measurements and the insufficiency of the groove produced by the pressure of the obliquus superior on the cadaveric eye as a basis for the compression theory.

WEINHOLD (808, Theory of sciascopic shadow rotation in astigmatism) discusses the fact that in skiascopy of astigmatic eyes with oblique axes the direction of the margin of the shadow does not usually agree with the direction of the axis of the movement of the mirror and is changed by the interposition of various spherical lenses. He corrects the astigmatism by a cylindric glass and asks how the border line between the lighted and the unlighted portion of the retina appears through such a cylinder. He shows that all lines which are not parallel or perpendicular to the axis of the cylinder appear to turn about a certain angle. The rotation of the shadow in skiascopy of astigmatic eyes with oblique axes is only a special example of this appearance.

HUBER (809 Late results of the myopia operation) reports 90 patients with 100 eyes on which the operation for myopia had been performed; 56 were women, 34 men, 80 were monolateral, 10 bilateral. Most of the operations were performed between the ages of eleven and thirty. After discussion of the lens the swollen lenticular masses were allowed to escape and usually a final discussion was performed. Before the operation the vision was from 0.1 to 0.25, immediately after its performance from 0.25 to 0.5, and at the last examination, from 2 to 12 years after the operation in 75 of the eyes, it was from 0.5 to 0.75. Vision was lost in 8 %. In 11, 14.67 %, new macula diseases were observed, which exceeded the number of diseases of the macula in eyes not operated on. 16% exhibited fresh opacities of the vitreous, about double the

number of vitreous opacities in non-operated eyes. Retinal hemorrhages occurred in 12%, including 2 cases of traumatic hemorrhage, against 3.51% in eyes not operated on. Retinal detachment occurred 5 times after operation, including 2 traumatic, while none occurred in the non-operated eyes. In two of the eyes operated on optic atrophy developed, in 1 glaucoma, in 1 septic infection. The refraction of the eyes operated on was from 12 to 30 D. of myopia. In the course of time 23 eyes became emmetropic, 12 myopic, and 34 hypermetropic. The number of emmetropic eyes almost doubled in the course of time, the hypermetropia diminished, and the number of myopes increased. In 37 eyes there was an average increase of myopia of from 1 to 3 D. The results lead Huber to the conclusion that the removal of the lens is not a certain palliative against the progress of myopia and its disastrous consequences, but such eyes remain as vulnerable as ever.

OTTE (810, *Clinical and statistical contributions to the study of myopia*) presents the statistics of 6006 cases of myopia observed in the clinic at Giessen between 1879 and 1899. The number of males was about double that of females. Nearly three times as many men as women had low degrees of myopia, while a myopia of 5 D. or more was proportionately more frequent in women. That near-work is not the only factor in the production of high myopia is shown by the division of myopia among the various callings; myopia of low degree is more frequently found among those who do near-work, that of higher degree more frequently among those who do not do near-work. 64.93% of all the cases had complications, viz., vitreous opacities in 3.29%, detachment of the retina in 0.44%, choroiditis in 4.71%, conus in 17.37%, divergent strabismus in 3.29%, convergent strabismus in 0.42%. In the higher degrees of myopia the complications were disproportionately frequent. By far the greater part of the complications, 72.53%, occurred in persons who did not do near-work, and only 27.47% among near-workers. In the higher degrees of myopia those who did not do near-work were the more subject to complications, in the lower degrees this was reversed.

FRENKEL (811, *Traumatic myopia*) divides traumatic myopia into four groups, spastic myopia, myopia in consequence of

relaxation of the zonula, myopia in consequence of subluxation or luxation of the lens, myopia in consequence of a lengthening of the axis of the eyeball, the result of an inflammatory process in the posterior part of the globe. It is incorrect to consider traumatic myopia as a curiosity. Prognosis is most favorable when the myopia is due to spasm of the accommodation, least favorable when due to subluxation or luxation of the lens, because of the danger of complication with glaucoma.

BERGER.

VACHER and BAILLART (812, Second note in regard to the influence of the total correction of the myopia over its progression and over detachment of the retina) are of the opinion that full correction should be given to those myopes alone in whom no fundus changes are present. Whether the full correction of myopia hinders or favors the occurrence of detachment of the retina they are not yet ready to say. Out of the 55 cases of retinal detachment which they studied, in only one, a man eighteen years old, had the myopia been fully corrected before the commencement of the retinal detachment.

BERGER.

NUEL (813, Etiology and pathogeny of certain irregular astigmatisms of the lens) studied four cases of irregular astigmatism of the lens. In each a conjunctival catarrh preceded. Nuel thinks that during the latter disease phlogogenous substances passed into the anterior chamber and through the lens capsule, where by their irritation they caused irregular signs of proliferation of the lens fibres which produced astigmatism and central anterior capsular cataract. The latter may occur without any perforation of the cornea. Very careful cleansing of the conjunctival sac is the best prophylaxis.

BERGER.

BARNES (814, Removal of the lens in myopia) gives a careful review of our present knowledge in regard to the operative treatment of high myopia. He reports the case of a girl 16 years old operated on by him. Before the operation the vision of the right eye was 20/70 with - 20- 1 cyl., of the left 20/70 with - 22- 1 cyl. The transparent lens was removed by linear extraction. The second eye became infected and produced a membrane which was needled. Final result R.V. 20/30 with - 2- 1 cyl., L.V. 20/30 with - 1. An inter-

esting point is that after the operation a convergent strabismus of the left eye appeared.

ALLING.

CLAIBORNE (815, *Axis of astigmatism*) refers to the known fact that in the great majority of cases the axis of hypermetropic astigmatism lies between 45° and 135° , while in myopic astigmatism it lies between 15° and 165° . He adds from personal observation that the preferred axes of the former are at exactly 90° , 105° , and 135° , of the latter at 180° , 15° , and 165° . The position of the axis is thus governed by the law of multiples, 15° being the smallest. The demonstration of this is purely empirical.

ALLING.

The statistical results given by BLACK (816, *Relation of the curvature of the cornea to the refraction*) from 2092 measurements of the cornea show an evident correlation between the corneal curvature and the refraction of the eye. He says that as a rule a long corneal radius corresponds to hypermetropia, a shorter one to myopia, according to its degree.

ALLING.

PERCIVAL (817, *Correction of astigmatism by tilting lenses*) claims that in order to correct the astigmatism which so frequently remains after an extraction of cataract the proper convex glasses may be tilted forward for patients who are unable to pay for the expensive combined glasses. The same effect is obtained as through a sphero-cylindric combination. Thus if a convex lens of 10 D. is inclined forward 24° its effect is almost exactly the same as that of a +10.5 sph. +2.5 D. axis horizontal. A table is added which shows the required tilting of the lens for different degrees of astigmatism.

DEVEREUX MARSHALL.

GOULD (818, *Etiology of astigmatism*) advances as the cause of astigmatism the well-known theory of lid pressure and explains oblique axes by influence of modifying agents such as irregular action or insertion of the external muscles.

ALLING.

EATON [819, *Experimental and clinical evidence of dynamic (spastic) astigmatism*] asserts his belief in dynamic astigmatism and offers in evidence the behavior of his own eyes. While wearing his correction for +0.75 D. astigmatism he sees all the lines on the astigmatic chart equally well. If he now adds a minus 3 D. sphere before one eye and overcomes its

effect by accommodation he finds an astigmatism of 0.5 D. produced. He thinks it is due either to accommodation or convergence or both.

ALLING.

BRUNS (820, *Change in astigmatism produced by chalazion*) noted in his own case a change in the axis of astigmatism lasting over two months, due to a chalazion on the upper lid.

ALLING.

CHIARI (821, *Contributo allo studio delle modificazioni delle curve corneali in rapporto alle contrazioni dei muscoli*) reports the results of a series of measurements made with the help of Javal's ophthalmometer on young people to ascertain the influence exerted by the contraction of the rectus externus and internus on the curvature of the cornea. His conclusions are that the contraction of the lateral recti affects the static condition of the astigmatic cornea and that in most cases this influence is felt simultaneously in the vertical and horizontal meridians. Almost always there is an increase of the curvature in the horizontal meridian and a decrease in the vertical.

CIRINCIONE.

VII.—MUSCLES AND NERVES.

823. GUTMANN, G. Two cases of congenital paresis of the inferior rectus, cured by operation. *Berliner klinische Wochenschr.*, No. 33, 1905.
824. GIESLICH, NIC. Infantile nuclear atrophy. *Deutsche med. Wochenschr.*, 1905, No. 37, p. 1462.
825. MAUCH, J. A case of true hypertrophy of the external eye muscles. *Arch. f. Ophthalm.*, lii., 1, p. 126.
826. BERGER, C. Isolated injuries of the external eye muscles. *Klin. Monatsbl. f. Augenheilk.*, xliii., ii., p. 480.
827. HIRSCHBERG, J. Result of a rare strabismus operation seen at the end of 32 years. *Centrbl. f. prakt. Augenheilk.*, xxxix., p. 335.
828. SIEMERLING. Contribution to the pathological anatomy of early isolated paralysis of the eye muscles. *Arch. f. Psychiatric*, 40, p. 41.
829. HAMMER, D. Paralyses of the eye muscles as the result of chronic lead and nicotine poisoning. *Zeitsch. f. Nervenheilk.*, 29, p. 323.
830. LANDOLT, E. Insufficiency of convergence. *Archives d'ophthal.*, xxv., p. 393.
831. DE LAPERSONNE, F. Ocular torticollis and strabismus sursumvergens. *Ibid.*, xxv., p. 585.
832. COPPEZ, H. Multiple and transitory paralyses of the ocular muscles. *Policlinique de Bruxelles*, May 15, 1905.
833. GAUSSEL, A. Paralysis of the associated lateral movements

of the eyes in affections of the cerebellum, corpora quadrigemina, and pons. *Revue de médecine*, 1905. *Bulletin médical*, 1905, p. 991.

834. VALUDE. Blepharospasm treated by deep injections of alcohol at the exit of the facial nerve. *Annales d'oculiste*, cxxxiv., p. 436.

835. ROOSA, D. B. ST. JOHN. Loss of vision from non-use. *Medical Record*, Feb. 25, 1905.

836. VINSENHALLER, F. Traumatic section of the external rectus, and probable laceration of the optic nerve. *Ann. of Ophth.*, April, 1905.

837. REDDINGIUS, R. A. Treatment of convergent strabismus. *Ned. Tydschr. v. Geneesk.*, 1905, ii., No. 10.

838. FORSELLS. The signification of paralysis of the abducens in otitis media. *Finska Laekaresaellsk. Handl.*, 1905, p. 136.

GUTMANN's (823, Two cases of congenital paresis of the inferior rectus) patients were two boys, 13 and 11 years old, who had had vertical strabismus from early childhood. The inferior rectus was found to be inserted not at 6.5mm, but in one case at 8 and in the other at 10mm. from the margin of the cornea. In both cases advancement of the inferior rectus produced the desired result.

RIESLICH's (824, Infantile nuclear atrophy) 14-year-old patient had a congenital paralysis of both facial nerves, of the left hypoglossus, and of movements of the eye to the right and left, while the convergence was preserved. The site of the congenital multiple cranial nerve paralysis, first described by Mœbius, is discussed. The extinction of the electric excitability showed the affection to be "in the peripheric neuron." He considers that the cause of the clinical appearances is to be sought in a disease of the medulla and the caudal end of the pons.

MAUCH (825, A case of true hypertrophy of the external eye muscles) examined an eyeball enucleated on account of carcinoma of the upper jaw. Macroscopically the stumps of the muscles had $3\frac{1}{2}$ times the diameter of those of normal eyes. Microscopic examination revealed a marked increase in the diameter of the individual fibres with no increase in their number. The explanation given of this hypertrophy due to activity was the difficulty experienced in moving the eye, which had gradually increased for four years in consequence of the very slowly growing tumor.

BERGER (826, Isolated injuries of the external eye muscles)

reports six cases of isolated injuries to the external eye muscles, one a complete separation of the inferior rectus, three of partial division of the internal or external rectus. These three healed perfectly spontaneously.

HIRSCHBERG (827, *Result of a rare strabismus operation seen at the end of 32 years*) reports the result at the end of 32 years of an operation for strabismus which he had performed on a woman 22 years old. The right eye squinted inward and downward, had defective movement outward, and the head was turned much toward the right. After tenotomy of the right internus the right externus was advanced after division of a dense connective tissue which bound its lower side to the eyeball. The operation resulted in a straight position of the eyes and a normal posture of the head, a result which is still maintained.

SIEMERLING's (828, *Contribution to the pathological anatomy of early isolated paralysis of the eye muscles*) observation was made on a woman 55 years of age suffering from morphinism, who had had ophthalmoplegia totalis externa with complete ptosis since her third year. She had limited motion of the left eye corresponding to the distribution of the oculomotorius, particularly upward, less inward and downward, and a moderate degree of ptosis. The pupils, which were contracted as a result of the morphinism, reacted very little to light and convergence. The patient died of pneumonia and the autopsy revealed destruction of the trochlearis and oculomotorius nuclei. There were remains of a hemorrhage in the form of a cyst with traces of blood pigment. On the right side the nucleus of the trochlearis was totally destroyed, on the left side a very small portion remained. On the right side there was only a small trace of the nucleus of the oculomotorius in the proximal portion, on the left side the distal and proximal ends were preserved. The roots of the oculomotorius were greatly degenerated on the right side, somewhat better preserved on the left. There was a great deficiency of fibres in the posterior or longitudinal bundles of both sides, but especially the right. The eye muscles themselves were fatty and atrophic. These changes seemed to have been caused by a hemorrhage which occurred in early childhood and was confined to the central gray matter in the region of the nuclei

mentioned. The cause of the hemorrhage could not be determined.

HAMMER's (829, *Paralyses of the eye muscles as the result of chronic lead and nicotine poisoning*) patients were: (1) A girl sixteen years old working in a porcelain manufactory, who had in addition to the general symptoms of lead poisoning neuro-retinitis and paralysis of the abducens of both eyes. Potassic iodide and baths cured the diplopia. The vision was reduced to 5/20. (2) A woman fifty-nine years old, formerly syphilitic and a great smoker, had retrobulbar neuritis, paresis of both motor oculi, and paralysis of the left abducens. The patient was forbidden to smoke, yet the ocular symptoms did not improve.

LANDOLT (830, *Insufficiency of convergence*) reports a case of insufficiency of convergence in a 13-year-old child which another physician believed he could cure by means of a tenotomy of the external rectus of the right eye. Convergent strabismus with homonymous diplopia resulted. A cure was finally obtained by means of an advancement of the left internal rectus.

BERGER.

DE LAPERSONNE (831, *Ocular torticollis and strabismus sursumvergens*) reports two cases of torticollis with strabismus at the same time. No diplopia could be demonstrated. Hence it could not be asserted that the torticollis was due to an attempt to secure single vision under the pressure of diplopia. The writer thinks that in both cases there was originally a disturbance of the co-ordinate movements of the eyes which manifested itself as a strabismus and at first induced diplopia which in turn occasioned the oblique position of the head. The latter persisted after the diplopia had disappeared. Treatment consisted in the advancement of the insufficient muscles. In one of the cases in which another ophthalmologist had produced strabismus sursumvergens by a tenotomy of the superior rectus, advancement of the inferior rectus was necessary before a cure could be effected.

BERGER.

COPPEZ (832, *Multiple and transitory paralyses of the ocular muscles*) observed the appearance of multiple transitory paralyses of the eye muscles as the initial symptom of tabes dorsalis in a woman 32 years of age. First there was paralysis

of the ciliary muscle of the left eye, then a paralysis of the same muscle on the right side, with coincident spasm of the accommodation and paralysis of the inferior rectus of the left eye. Five days later there was a secondary contracture of the left levator palpebræ, probably caused by paralysis of the orbicularis. After another five days there was a paralysis of the right external rectus, and three days later a paralysis of the right inferior rectus with spasm of the accommodation on the same side. After three weeks only a paralysis of the right inferior rectus could be found, but Westphal's and Romberg's symptoms were present and the case was recognized as one of incipient tabes.

BERGER.

GAUSSEL (833, *Paralysis of the associated lateral movements of the eyes in affections of the cerebellum, corpora quadrigemina, and pons*) comes to the following conclusions : (1) The persistent conjugate deviation of the eyes and the paralysis of the lateral movements of the eyes without change of their direction do not occur in diseases of the cerebellum. (2) The latter paralysis, with or without deviation, excludes the presence of disease of the corpora quadrigemina. The latter is not a centre for the associated lateral movements of the eyes. (3) The paralysis of the associated lateral movements of the eyes with preservation of the convergence and the movements of the eyes upward and downward is characteristic of a lesion in the upper part of the pons.

BERGER.

VALUDE (834, *Blepharospasm treated by deep injections of alcohol at the exit of the facial nerve*) reports two cases of blepharospasm in which perfect recovery was obtained by means of an injection of alcohol containing 1% of cocaine at the exit of the facial nerve from its bony canal according to Schloesser's method. In one of the cases the injection was followed by a swelling in the parotid region, but after a few days this passed away.

BERGER.

ROOSA (835, *Loss of vision from non-use*) reports the case of a man 46 years old who when a child had convergent strabismus of the right eye. Divergence followed an operation and this was later corrected by another operation. Some years later his left eye, the better one, was injured and his vision fell to 20/200. After he had constantly worn the correction

for a high degree of astigmatism over his right eye for a year and a half the patient was able to read Jaeger No. 1. At the end of a few months more his vision had risen to 20/30.

ALLING.

The injury reported by VINSENHALLER (836) was a total detachment of the external rectus by the point of an umbrella which penetrated into the orbit. The injury resulted in optic atrophy.

ALLING.

REDDINGIUS (837, *Treatment of convergent strabismus*) reviews the work of Claud Worth, *Squint, its Causes, Pathology, and Treatment*, and claims that a large part of the theories there promulgated had been previously advanced by himself. He explains Worth's failure to obtain satisfactory results from operations in alternating convergent strabismus by the statement that then the exercises of each are undertaken singly and are begun with the exercises in simultaneous vision and in fusion, while exercises in the vision of corresponding portions of the visual fields should precede.

JITTA.

FORSELLES' (838, *The signification of paralysis of the abducens in otitis media*) case was one of a boy who had an acute otitis media with a free flow of pus. On the 5th day there was pain in the left side of the head with swelling over the left mastoid and on the 13th day paralysis of the left abducens appeared. On the 20th day the mastoid was opened and pus found in the cells. The next day the skull was trephined, but no new collection of pus found. Two months and a half later the patient was well and had no diplopia. From this case together with a consideration of twenty taken from literature Forselles concludes that the paralysis of the abducens is due to a slight meningitis caused by infection. As regards treatment he thinks that the mastoid cells should be opened, and if this does not relieve the pain in the head the cranial cavity should be opened in the middle fossa.

HELLGREN.

Sections VIII.—XII. Reviewed by DR. R. SCHWEIGGER,
Berlin.

VIII.—LIDS.

839. FOX, L. WEBSTER. Ablepharia partialis of the upper eyelid.
Annals of Ophthalmology, July, 1905.

840. RAEHLMANN, E. Amyloid degeneration of the lids and conjunctiva. *Klin. Monatsbl. f. Augenheilk.*, xliii., ii., p. 435.
841. MANZUTTO, G. Un caso di sclerosi iniziale doppia delle palpebre. *Annali di ottalmologia*, 1905, pp. 37-42.
842. HOTZ, F. C. The technique of implanting Thiersch epidermis grafts in the operation of symblepharon. *Annals of Ophthalm.*, July, 1905.
843. BRUNS, H. D. Ptosis and the operation of Motaïs. *Annals of Ophthalmology*, July, 1905.
844. WERNER, LOUIS. Unilateral ptosis and oedema of the lids (?). Thrombosis of the cavernous sinus occurring in the course of scarlatina. *Ophthalmoscope*, May, 1905.
845. CHRONIS, P. D. A radical operation for the cure of trichiasis and entropion of both lids. *Klin. Monatsbl. f. Augenh.*, xlivi., ii., p. 6.
846. MORETTI, E. L'iniezione di paraffina fusa nella cura dell'entropion. *Annali di ottalmologia*, 1905, pp. 391-395.
847. BIRCH-HIRSCHFELD. Further experience in the use of the cartilage of the ear for the restoration of defects of the lids. *Muenchener medicinische Wochenschrift*, 1905, No. 43, p. 2075.
848. CALDERARO. Sui migliori processi di blefaroplastica. *La clinica oculistica*, April-July, 1905.
849. RUECKEL, W. Lymphoma or lymphadenoma of the lids and orbit. *Inaug.-Diss.*, Giessen, 1905.
850. ISCHREYT. Two cases of xeroderma pigmentosum with formation of tumors in the lids. *Zeitschr. f. Augenheilk.*, xiv., 1, p. 31.
851. VALUDE. Epithelioma at the internal canthus. *Soc. d'ophthalmol. de Paris*, June 6, 1905.
852. DARIER. Treatment of epithelioma by radium. *Soc. d'ophthalmol. de Paris*, July 4, 1905.
853. VALUDE. Radiotherapy of epithelioma. *Annales d'oculistique*, cxxxiv., p. 81.

Fox (839, *Ablepharia partialis of the upper eyelid*) describes a case in which there was entire absence of both eyebrows—the skin passing from the forehead over the supraorbital ridges. In place of the normal eyelids the skin was prolonged into two pointed flaps the apices of which were adherent to the cornea. In one lid a vestige of cartilage could be felt. The eyeballs were in a condition of xerosis from lack of moisture. There was only perception of light. ALLING.

Amyloid is found in the eye according to RAEHLMANN (840, *Amyloid degeneration of the lids and conjunctiva*) as a purely local state without disturbance of the general condition and is capable of being retransformed chemically into normal albumin. The amyloid degeneration may start in the con-

nective tissue, muscles, vessels, skin, and glands, and may be confined to any one of these tissues. Frequently it is preceded by a hyaline degeneration. Colloid and mucous transformations were also present.

MANZUTTO's (841, *Un caso di sclerosi iniziale doppia delle palpebre*) case is the ninth of double chancre of the lids now published.

CIRINCIONE.

To facilitate the perfect apposition of Thiersch grafts to both bulbar and lid surfaces, after dissecting off the symblepharon, HOTZ (842, *The technique of implanting Thiersch epidermis grafts in the operation of symblepharon*) uses a lead or tin plate and fastens it, in the case of the lower lid, by sutures passing through the upper edge of the plate and the lid border. This arrangement allows opening of the eye and inspection of the bulbar portion of the flap. In cases where the upper lid is involved he finds it necessary to use a plate covering the whole eyeball reaching from the upper to the lower fornix. A hole may be cut to leave the cornea free. The lids are sewed together.

ALLING.

BRUNS (843, *Ptosis and the operation of Motaïs*) finds the operation of Motaïs for ptosis (suture of the tendon of the superior rectus to the upper lid between the skin and tarsus) very effective and describes five successful cases. The upper lid follows the movement of the eye far better than with other operations hitherto employed.

ALLING.

WERNER's (844, *Thrombosis of the cavernous sinus during scarlatina*) patient, a boy six years old, had a mild attack of scarlet fever. Its course was favorable until the ninth day, when the temperature rose and the patient became stupid. The right eye protruded, its lids red and swollen. The temperature fell after a few days, but the exophthalmos persisted for some time and then disappeared. There was no change in the fundus, no ear trouble, and no albuminuria. The author is of the opinion that very probably a thrombosis of the cavernous sinus was the cause of these symptoms, rather than a metastatic cellulitis independent of the thrombosis. The interesting points about this case are the absence of otitis media, the complete restoration without suppuration, and the long persistence of the exophthalmos after the subsidence of the acute symptoms.

DEVEREUX MARSHALL.

CHRONIS (845, *A radical operation for the cure of trichiasis and entropion of both lids*) begins his operation with division of the outer canthus, enters the lid *2mm* from its margin, splits it, separates the muscles from the tarsus, thins the latter, completes the canthoplasty with three sutures, and finally makes an intermarginal incision *1mm* deep behind the lashes.

MORETTI (846, *L'iniezione di paraffina fusa nella cura dell'entropion*) does not accept the conclusions of Bolognesi in regard to the injection of paraffin in operations for entropion.

CIRINCIONE.

BIRCH-HIRSCHFELD (847, *Further experience in the use of the cartilage of the ear for the restoration of defects of the lids*) says that Elter and Haas are in error in claiming priority in the repair of lids with the cartilage of the ear and that Buedinger is entitled to this honor. In another article in the same journal Elter and Haas acknowledge Buedinger's priority.

After a brief historical review of blepharoplasty CALDERARO (848, *Sui migliori processi di blefaroplastica*) divides these operations into four groups: (1) Indian method with twisted flaps; (2) French method with sliding flaps; (3) pedicled flaps; and (4) the palpebro-palpebral method. He considers each of these methods in a separate chapter and presents the advantages and deficiencies of each operation on the basis of his clinical and anatomical investigations. His conclusions are: (1) The best blepharoplastic operation is Fricke's, a pedicled flap taken from the neighboring region and turned so as to cover the loss of substance. (2) In order to overcome the elastic and cicatrical contraction the flaps should be cut twice as large as the surface to be covered. (3) The nutrition which the flap receives through the pedicle is necessary for its life during the first 36 hours, after that it draws its nourishment from the subjacent surface and the pedicle may be excised or otherwise disposed of, yet it is to be recommended as a good precaution to leave it alone for a couple of weeks. (4) The bodies of the flaps should contain only the cutis but the pedicle must also contain the subcutaneous tissue. It is not necessary to reject cutis with cicatrical places, provided that the scars are not adherent to bone. (5) Twisted

flaps attach themselves well to a surface in from 24 to 48 hours, even when the surface is of bone denuded of periosteum, or includes a small cavity. (6) To cover the places left bare by the removal of the flaps the edges of the adjoining cutis are drawn together, and when this is not possible the surface is left to granulate. The anæsthetic effect is better than that obtained by the use of pedicle. (7) When it is impossible to obtain suitable flaps from the face Tagliacozzi's operation may be performed. (8) The result obtained by twisted flaps is definitive and permanent, at least after a year. (9) The use of sliding flaps in blepharoplasty must be given up as insufficient and injurious. The same is to be said of de Wecker's mosaic grafts of the dermo-epidermis. (10) Wolfe's broad skin graft is indicated as a covering for the upper lid only when the margin and framework of the lid are well preserved. In such cases the delicate skin of the prepuce or of the labia majora should be used. Wolfe's grafts should be used to replace loss of skin of the lower lid, or in the region of the canthus, only in case of necessity when the use of twisted flaps is impossible. (11) Thiersch grafts are excluded from ophthalmic surgery. (12) For the reconstruction of a lid *in toto* the only operation productive of excellent final results is the palpebro-conjunctival of Prof. Cirincione, by means of which a half lid may be restored *in toto* at the expense of the conjunctiva of the remaining lid. For the inner half of the lid the sliding operation of de Vincentiis may be used.

CIRINCIONE.

The lymphadenoma described by RÜCKEL (849, *Lymphoma or lymphadenoma of the lids and orbit*) had existed in a young girl for about a year, had produced a tumor as large as a bean in the lower lid, and another as large as a pea in the upper lid. It presented a bluish appearance through the skin, was soft and easily pressed back into the orbit. The eyeball was pressed somewhat outward and forward. At the operation the tumors were found attached together and to the bones in the orbit. They contained spaces filled with fluid which was partly thin and yellow, partly thick and bloody. The compact mass was lymphadenoma, the cysts were dilated lymph vessels. There were no glandular swellings. There was no recurrence. The lymphoma of the lids and orbit is a rare and interesting form of tumor because neither lymph

vessels nor lymph follicles occur in the orbit itself. Only in the neighborhood of the lachrymal gland are there lymphatic connective tissue and follicles. In the neighborhood of the lachrymal sac also some of the described lymph tumors have originated. Simple lymphomata should be extirpated at as early a date as possible, but the leucæmic variety should be avoided on account of the danger of hemorrhage, and subjected to the influence of X-rays and radium. In pseudo-leucæmia the tumors should be removed as early as possible and the patients treated with arsenic and potassic iodide.

ISCHREYT's (850, *Two cases of xeroderma pigmentosum with formation of tumors in the lids*) first patient, a boy ten years old, had passed the stages of erythema and of teleangiectasis and pigmentation of xeroderma pigmentosum and had already entered upon the third stage, that of tumor formation. The tumors were angioma, warts, and carcinomata. The lids were affected with œdema, teleangiectasis and loss of lashes, ectropion and carcinoma. The conjunctiva was swollen, the tarsus undergoing cystic degeneration. Both corneaæ had white opacities and a pannus-like new formation of vessels. The second case was seen in an earlier stage. His parents were related.

VALUDE (851, *Epithelioma at the internal canthus*) exhibited a wax impression of a case of epithelioma of the inner margin of the lid which was cured by radium. BERGER.

DARIER (852, *Treatment of epithelioma by radium*) exhibited a patient in whom an epithelioma of the inner margin of the lid had resisted cauterization and extirpation and was cured by radium. Particular attention was called to the soft yielding scar which resulted from the latter treatment. Darier showed some radium pastilles by means of which the individual reaction of patients to the radium treatment can be quickly determined. BERGER.

VALUDE (853, *Radiotherapy of epithelioma*) reports four cases of cancerous tumors of the lids and conjunctiva which had been treated by means of the X-rays and radium. The first was a recurrent epithelioma of the cheek with extension to the lower lid. Radium applied. No result. The second was a recurrent palpebro-conjunctival epithelioma. Radium applied. Improvement. The third was a cancer of the skin

of the inner margin of the lid. Radium applied. Recovery. The fourth was a papilloma of the upper lid. Recovery under radium. In the second case the X-rays were also applied and seemed to contribute more to the improvement than the radium. Valude is of the opinion that the use of radium or the X-rays is indicated only in the benign forms of cancer or papilloma, while in the malignant forms extirpation should be practised as early as possible.

BERGER.

IX.—LACHRYMAL APPARATUS.

854. MORELLI, E. Sopra un caso di dacrioadenite orbitaria suppurata consecutiva ad erysipela faciale. *Annali di ottalmologia*, 1905, pp. 3-32.
855. ORLANDINI, O. Studi sulle dacrioadeniti. *Annali di ottalmologia*, 1905, p. 304.
856. CAPOLONGO, C. Osservazione clinica ed anatomica su di un caso di dacriops. *Archivio di ottalm.*, xii., 9-10.
857. GOLDZIEHER, M. Cyst of the lachrymal gland. *Dacryops. Arch. f. Ophthalmologie*, lxi., 2, p. 339.
858. VAN DUYSE. Contribution to the study of symmetric, pseudoleucämic lymphomata of the lachrymal and salivary glands. *Archives d'Ophthal.*, xxv., p. 705.
859. PLITT, W. Tuberculosis of the lachrymal gland. *Klin. Monatsbl. f. Augenheilk.*, xliii., Beilageheft, p. 40.
860. DEMARIA, E. B. Cylindroma of the lachrymal gland. *Klin. Monatsbl. f. Augenheilk.*, xliii., 2, p. 513.
861. CORNER, ALBERT. Inflammation of the lachrymal passages. *British Medical Journal*, April 30, 1904.
862. SHIBA, S. The etiology of inflammation of the lachrymal sac with tuberculosis of the neighborhood. *Tuberculous dacryocystitis. Klin. Monatsbl. f. Augenheilk.*, xliii., Beilageheft, p. 63.

MORELLI (854, *Sopra un caso di dacrioadenite orbitaria suppurata consecutiva ad erysipela faciale*) reports the clinical history and objective examination of a case of acute, mono-lateral dacryoadenitis which followed an attack of facial erysipelas. Streptococci were found in the pus. After the glandular abscess had been opened the symptoms which depended on its pressure on the eyeball and the involvement of the cellular system of the orbit, exophthalmus, displacement of the globe, diplopia, disappeared. The author discusses these symptoms, particularly the exophthalmos, which he ascribes to the involvement of the retrobulbar connective tissue in the inflammatory process.

CIRINCIONE.

ORLANDINI (855, *Studi sulle dacrioadeniti*) describes a considerable number of cases of dacryoadenitis which he has had opportunity to study. From his observations it appears that the palpebral portion of the gland is the more easily affected. The author is of the opinion that in many cases the cause of the trouble is infection carried by the blood-vessels from the conjunctiva or some distant organ. In a woman who died of pleuropneumonia the inflamed lachrymal gland contained diplococci which presented the morphological characteristics of Fränkel's. Another method of extension of the inflammatory process when seated in the conjunctiva is along the excretory canaliculi of the gland. In two cases of trachoma it was observed that the disease had involved the excretory ducts and in another case had extended to the parenchyma of the palpebral portion. The bacteriological examination proved negative in the non-suppurative forms and usually in the suppurative, but in some of the latter the staphylococcus pyogenes was found. This seems to indicate that the secretion of the lachrymal gland is particularly unfavorable to the life of micro-organisms.

CIRINCIONE.

CAPOLONGO's (856, *Osservazione clinica ed anatomica su di un caso di dacriops*) microscopic examination showed that the lesion was due to a cystic dilatation of an efferent duct of the gland. The acini were evidently in a state of secretory activity. As to the pathogenesis the author concludes that probably the excretory duct became closed in consequence of an inflammation which extended hither from the conjunctiva.

CIRINCIONE.

GOLDZIEHER (857, *Dacryops*) examined microscopically a dacryops which measured 23mm long, 17mm in the sagittal and 11mm in its frontal diameter. Adherent glandular tissue containing mucus, as well as the multi-lobularity of the cyst, indicated that it was not a true retention cyst, but was rather a so-called mucous cyst and that it was caused by a disease of the gland.

On the basis of a very carefully studied case and the literature of all analogous cases, VAN DUYSE (858, *Contribution to the study of symmetric, pseudoleucæmic lymphomata of the lachrymal and salivary glands*) comes to the conclusion

that Mikulicz's disease, symmetric tumors of the lachrymal and salivary glands from ectogenous infection, is not to be looked upon as a single disease. In his case there was a pseudo-leucæmic symmetric disease of the lachrymal and salivary glands, a hypertrophy of the peripheral lymphatic glands, a broad dark zone in the mediastinum shown by means of the Roentgen rays, and a swelling of the spleen. The diminution of the lymphoma of the lachrymal gland was obtained by the X-rays. The favorable influence exerted by the X-rays on leucæmic or pseudo-leucæmic tumors is confirmed. On the basis of the microscopic examination of the blood in his case van Duyse claims that the difference between leucæmia and pseudo-leucæmia is difficult to maintain.

BERGER.

According to PLITT (859, *Tuberculosis of the lachrymal gland*) a bilateral swelling of the lachrymal glands developed gradually during five years in a scrofulous girl and finally the glands became spontaneously luxated. Extirpation revealed the tuberculous character of the tumors. The glands showed no signs of inflammation. The upper retrotarsal conjunctival fold on one side showed tuberculous changes, while on the other the lachrymal sac was diseased. Some time later tuberculosis appeared in the axillary glands, the first manifestation of general tuberculosis.

The cylindroma of the orbital part of the lachrymal gland described by DEMARIA (860, *Cylindroma of the lachrymal gland*) occurred in a woman 33 years old without known cause. Within a few months a hard, movable tumor behind the ptotic upper lid developed with exophthalmos and bad vision. It pressed upon the optic nerve as the globe, aside from the lack of tears, was normal. Ten months after the extirpation there was a local recurrence with the same clinical picture. The orbit was exenterated, but the tumor recurred and the patient died.

CORNER (861, *Inflammation of the lachrymal passages*) recommends the application of tincture of iodine to the turbinated bones. He does not advise opening of the naso-lachrymal canal.

DEVEREUX MARSHALL.

SHIBA (862, *The etiology of inflammation of the lachrymal sac with tuberculosis of the neighborhood. Tuberculous*

dacryocystitis) reports twelve cases of extirpation of the lachrymal sac in which the sac was plainly tuberculous. Some presented the clinical picture of the ordinary purulent dacryocystitis, some that of phlegmon. It thus appears to be more frequent than has been supposed and this is another reason why chronically purulent sacs should be extirpated. When healing is interfered with it is to be assumed that the bacilli have entered the surrounding tissue. Primary tuberculosis of the lachrymal sac is not so rare; all stubborn cases are suspicious. Tuberculosis of the sac and of the conjunctiva arises much more frequently from the nose than from the conjunctiva.

X.—ORBIT AND NEIGHBORING CAVITIES.

863. DE LAPERSONNE. Phlegmon of the orbit and optic atrophy. *L'ophtalmologie provinciale*, Feb., 1905.
864. KAISER, FR. A case of orbital phlegmon with formation of abscesses in the regions of the nose, cheek, and temple, and with involvement of the nasal cavity and pharynx. *Arch. f. Ophthalm.*, lxi., 3, p. 457.
865. MEDING, C. G. Two cases of subperiosteal hemorrhage of the orbit from scurvy. These *ARCHIVES*, xxxiv., p. 611.
866. BLACK, N. M. Difficulties in the diagnosis of aseptic foreign bodies in the orbit. *Ophth. Record*, April; 1905.
867. LEDBETTER, S. L. Breech-pin three years in the orbit. *Ophth. Record*, March, 1905.
868. POSEY, W. C. Shot wound of the orbit. Post-traumatic delirium. Extraction of bullet with preservation of the eyeball. *Ophth. Record*, March, 1905.
869. CZERMAK, W. Osteoplastic resection of the outer wall of the orbit. *Deutsche med. Wochenschr.*, 1905, No. 39-40.
870. CAUSE, FR. The pathogenesis of traumatic diseases of the orbit. Emphysema of the orbit. Retrobulbar hemorrhage. Traumatic enophthalmos. *Arch. f. Augenheilkunde*, lii., 3, p. 313.
871. PIHL, A. A tumor-like formation in an empty orbit. Pathological examination. *Archiv f. Ophthalmologie*, lxi., 1, p. 223.
872. BINDI, F. Endotelioma periostale melanotico dell' orbita. Emoangio endotelioma. Contributo clinico-ematologico ed istologico. *Annali di ottalmologia*, 1905, pp. 541-569.
873. BARDELLI, L. Echinococcus of the orbit. *Ibid.*, pp. 465-480.
874. TREU, E. A case of echinococcus of the orbit. *Arch. f. Augenh.*, liv., 2, p. 171.
875. LUKIS, J. M. Orbital sarcoma. Kroenlein's operation. *Ophthal. Review*, August, 1905.

876. RING, G. O. Sarcoma of the orbit. Report of a case. *New York Medical Journal*, June 19, 1905.
877. HANSELL, H. F. A case of cystic sarcoma of the orbit. Extirpation. Death. *Ophthalmic Record*, July, 1905.
878. MELLER, J. Lymphatic tumors of the orbit and the eye. *Archiv f. Ophthalmologie*, lxii., 1, p. 130.
879. HAGEN-THORN, J. E. Intermittent exophthalmos with varix racemosus capitis communicans. Operation. Recovery. *Russk. Vratisch*, 1905, No. 30.
880. POSEY, W. C. Intermittent exophthalmos, with report of a case. *Jour. Amer. Med. Association*, Feb. 18, 1905.
881. HANSELL, H. F. Pulsating exophthalmos. Successive ligations of the common carotid artery of each side. Death. *Ibid.*
882. SATTLER, H. A new operation for the treatment of pulsating exophthalmos. *Klin. Monatsbl. f. Augenheilk.*, xliii., 2, p. 1.
883. SCHWALBACH, G. Treatment of pulsating exophthalmos. *Ibid.*, 475.
884. LEWIN, H. A case of spontaneous luxation of the globe. *Berl. klin. Wochenschr.*, 1905, No. 35, p. 1105.
885. BOSSALINO, D. Contributo allo studio dell' anatomia patologica delle pareti orbitali. Cisti ematica del seno frontale. *Annali di ottalmologia*, 1905, pp. 408-420.
886. FISH, H. M. The connection between diseases of the accessory nasal sinuses and internal diseases of the eye. *Arch. f. Aug.*, lii., 3, p. 275.

DE LAPERSONNE (863, Phlegmon of the orbit and optic atrophy) observed a case in which a furuncle of the brow was the starting-point of an orbital phlegmon which resulted in suppurative dacryoadenitis, a periostitis of the margin of the orbit with separation of a sequestrum due to secondary infectious staphylococcus osteomyelitis, and an optic atrophy on the same side. The last must have been due to the action of toxines.

BERGER.

KAISER (864, A case of orbital phlegmon with formation of abscesses in the regions of the nose, cheek, and temple, and with involvement of the nasal cavity and pharynx) describes a case with extensive inflammation and abscess formation particularly along the veins which were connected with the orbit. Probably there was a thrombophlebitis which extended to the pterygoid plexus and through the angular vein to the external nasal vein and involved the veins of the nose and pharynx.

MEDING (865, Two cases of subperiosteal hemorrhage of the

orbit from scurvy) reports two very similar cases of subperiosteal hemorrhage in the orbit, clinically characterized by swellings above the lachrymal glands, together with petechiae on the temple and abdomen, and exophthalmos. Proper diet brought about recovery in both cases in a few weeks.

TREUTLER.

BLACK (866, Difficulties in the diagnosis of aseptic foreign bodies in the orbit) describes a case in which a number of splinters of wood were found in the upper part of the orbit. The presence of these foreign bodies was made probable only by the persistence of exophthalmos after the traumatism. This occurrence shows that fairly large foreign bodies may enter the orbit without injury to the eyeball or its adnexæ and without leaving any marked trace. It may happen that the patient knows nothing of any foreign body and the physician may be first consulted on account of loss of vision. Then it may be found in a given case that there is at most a slight irritation of the eye with more or less marked exophthalmos and limitation of motion.

ALLING (F.).

The piece of metal removed by LEDBETTER (867, Breech-pin three years in the orbit) was about 30mm long by 20mm broad. It had destroyed the eye and lay firmly encapsulated in the bony wall of the orbit.

ALLING (F.).

CZERMAK (869, Osteoplastic resection of the outer wall of the orbit) secures by his modification of Kroenlein's operation a greater convenience of approach and better protection to the soft tissues in the orbit, which is desirable when a small tumor is situated behind the apex of the orbital pyramid, or when a tumor lies beneath the eyeball and reaches far forward, or finally when it is situated on the nasal side of the eyeball.

The emphysema of the orbit reported by CAUSE (870, The pathogenesis of traumatic diseases of the orbit. Emphysema of the orbit. Retrobulbar hemorrhage. Traumatic enophthalmos) was relieved by means of a syringe with a long needle so that the eye sank back at once to its normal position. The origin of an emphysema of the lid from one of the orbit is through three weak places in the septum orbitale, situated one at the anastomosis of the orbital and facial vessels, the other two at the upper margin of the orbit. Through these a true orbital emphysema may become an

orbito-palpebral. A retrobulbar hemorrhage which had caused great exophthalmos was also aspirated while fresh with a large syringe and the eyeball thus returned to its normal position. The exophthalmos described by Cause appeared within a week after a kick which fractured the lower wall of the orbit. In order that the eyeball should have sunken there must have been a dilaceration of the supporting fascia which joins the muscles both with Tenon's capsule and also by means of the third portion with the wall of the orbit and is not identical with the septum orbitale. At the same time space is often left behind the globe by a cicatrizing hemorrhage for the retraction of the eyeball.

The tumor-like formation described by PIHL (871, *A tumor-like formation in an empty orbit. Pathological examination*) was granulation tissue which formed about a foreign body which had entered the orbit at the time of injury. It contained cholesterolin crystals and ferruginous pigment. Numerous giant cells and epithelial cells gave the picture of the so-called foreign-body tuberculosis.

BINDI (872, *Endotelioma periostale melanotico dell' orbita. Emoangio endotelioma. Contributo clinico-ematologico ed istologico*) gives the clinical history of a case in which a tumor appeared in the left orbit without any previous trauma, dislocated the eyeball downward, and greatly reduced the vision. The tumor was extirpated together with the eyeball and the external apophysis of the orbit. The histological examination showed it to be composed of roundish, frequently multi-nuclear connective-tissue elements arranged in imperfect cavities containing red corpuscles and with a thin connective-tissue wall. It contained numerous vascular cavities with frequent extravasations near which melanotic pigment could be found. The author considers that the neoplasm was of periosteal origin and that it was an endothelioma.

CIRINCIONE.

BARDELLI (873, *Echinococcus of the orbit*) insists on the importance which modern haematological researches attribute to the examination of the blood as a fundamental condition for the diagnosis of echinococcus cysts. These researches have shown that this disease is very frequently

accompanied by eosinophilia. This condition was found in his case.

CIRINCIONE.

A monolateral exophthalmos, which had existed nine years, had increased intermittently after three births and after a harsh examination. TREU (874, *A case of echinococcus of the orbit*), who performed Kroenlein's operation on the case four months later, found the orbit filled by an echinococcus cyst, and believes that the examination of the eyeball luxated the globe forward and that it was secured in this place by the rapid growth of the cyst.

LUKIS's (875, *Orbital sarcoma. Kroenlein's operation*) patient was a man forty-five years old who had a large swelling beneath the left upper lid, which had forced the eyeball downward, outward, and forward. A tumor could be felt between the roof of the orbit and the eye. The pupil could scarcely be seen. The eye had lost all perception of light. Kroenlein's operation was performed without opening the conjunctiva. The tumor was exposed and shelled out with the finger. The bone and soft parts were replaced and sutured. Healing was prompt and the eyeball returned into the orbit. The tumor was a small spindle-celled sarcoma measuring $2\frac{1}{2}$ by $1\frac{1}{2}$ inches. A month after the operation the fundus was normal and the vision §.

DEVEREUX MARSHALL.

RING (876, *Sarcoma of the orbit. Report of a case*) advises an exploratory incision in cases of tumors of the orbit and believes that the virulence and the danger of metastasis can be lessened by treatment with the X-rays. The result of sterilization of malignant neoplasms in other parts of the body by cataphoresis indicates the application of this method to tumors of the orbit also.

ALLING (F.).

The tumor excised by HANSELL (877, *A case of cystic sarcoma of the orbit. Extirpation. Death*) was about the size of a man's fist and weighed 315 grams. It was largely cystic.

ALLING.

MELLER (878, *Lymphatic tumors of the orbit and the eye*) observed lymphatic tumors not only in the orbit, but also in the conjunctiva and cornea and intraocularly in the choroid. They were usually flat, scale-like thickenings, but appeared also as compact tumors. Operation is dangerous

on account of hemorrhage. The basis is almost always lymphatic leucæmia.

Non-pulsating exophthalmos with obscuration of vision occurred in a patient of HAGEN-THORN'S (879, *Intermittent exophthalmos with varix racemosus capitis communicans. Operation. Recovery*) who was suffering from an extensive varix racemosus whenever she bent her head forward. When the head was bent backward the exophthalmos disappeared and the vision returned. Ophthalmoscopically everything was normal except for a rather marked tortuosity of the retinal veins. After the varix had been cured by operation the exophthalmos returned no more. The author ascribes the cause of the exophthalmos to a congenital abnormal dilatation of the orbital veins.

HIRSCHMANN.

POSEY (880, *Intermittent exophthalmos, with report of a case*) has collated 40 cases of intermittent exophthalmos which showed itself under particularly favoring circumstances, such as stooping. The clinical history as well as the absence of pulsation and bruit distinguished them from exophthalmos due to the presence of vascular tumors. The probable cause is the formation of variccs in the orbit.

ALLING (F.).

In HANSELL'S (881, *Pulsating exophthalmos. Successive ligations of the common carotid artery of each side. Death*) case the exophthalmos and the bruit disappeared immediately after the ligation. Six weeks later increasing retinal hemorrhages and recurrence of the exophthalmos necessitated ligation on the other side. The patient died five days later in convulsions.

ALLING (F.).

SATTLER (882, *A new operation for the treatment of pulsating exophthalmos*) obtained a good result in a case of pulsating exophthalmos due to retrobulbar aneurismal varix by the ligation and resection of the dilated superior ophthalmic vein alone. To do this Kroenlein's operation is not necessary. Perfect healing is obtained through thrombosis in the cavernous sinus which causes great pain in the back part of the head for at least two weeks, but is attended with no real danger.

SCHWALBACH (883, *Treatment of pulsating exophthalmos*)

published a year before Sattler a case of ligation of the orbital vein in a traumatic arterio-venous aneurism of the internal carotid and the cavernous sinus, after the common carotid of the same side had been ligated without result. The boy recovered after five days. The operation should always be performed first on the varix.

LEWIN'S (884, *A case of spontaneous luxation of the globe*) patient, a corpulent man fifty-three years old, had a bilateral, uncomplicated exophthalmos which was somewhat increased by excitement. Suddenly, during sleep, the left eye protruded beyond the lids, causing pain. The patient was able to replace it himself. But the accident repeated itself frequently and occurred occasionally to the right eye also when he stooped or had his lids everted, so that the luxation became to a certain degree habitual. The eyes suffered no permanent injury. During luxation the ophthalmoscopic picture was that of compression of the optic nerve, or of the central vessels; externally there was stasis of the blood. Recovery followed quickly.

BOSALINO'S (885, *Contributo allo studio dell' anatomia patologica delle pareti orbitali. Cisti ematica del seno frontale.*) patient suffered a severe traumatism of the eye in Nov., 1898, with the following immediate consequences: rupture of the cornea, prolapse of the iris, ecchymosis and considerable intumescence of the orbital region, and a slight degree of exophthalmos. In May, 1901, there was a swelling at the site of the right frontal prominence, very marked exophthalmos, the eyeball dislocated downward and forced outward. The movements of the eye were preserved and with slight pressure the eyeball could be pressed back into the orbit. Operation revealed an intumescence which raised the periosteum together with a thin plate of bone and involved the entire upper wall of the orbit and a part of the outer. Between two layers of bone was a cavity which contained a brownish cyst of less than fibrous consistence and as large as a small nut, which was easily removed. The histological examination showed that the cyst wall was formed of a connective tissue which exhibited various peculiarities in its outermost and innermost layers. In the midst of the connective tissue which formed the wall of the cyst there were numerous crystals of haema-

toidin and collections of yellowish-brown pigment. There was no trace of an epithelial covering to the outer surface of the cyst wall. The author is of the opinion that this was a true hemorrhagic cyst which developed in the frontal sinus as the result of the traumatism.

CIRINCIONE.

FISH's (886, *The connection between diseases of the accessory nasal sinuses and internal diseases of the eye*) seven cases seem to him to demonstrate the causal relation between diseases of the accessory sinuses and uveitis, *i.e.*, swelling of the ciliary body, shown by recession of the near point, and of the iris with synchiaæ, deposits and opacities of the vitreous, and also injection of the conjunctiva, œdema of the lids, slight œdema of the fundus, and hyperæmia of the papilla. The disease of the accessory sinus could always be detected only by a very careful special examination, and does not consist of open empyema with free outflow, but of a simple mechanical stenosis or closure of the naso-frontal canal by congestion or inflammation, so that Fish accepts Zieben's theory of passive venous stasis in the orbit. Even though no pathological secretion was previously visible in the nose, yet it usually flowed from the naso-frontal canal after it had been probed, and in comparison with this drainage of the sinus all other methods of treatment were of little use.

BOOK REVIEWS.

I.—**The Pathology of the Eye.** By J. HERBERT PARSONS, B.S., D.Sc. (London), F.R.C.S. (England); Assistant Ophthalmic Surgeon, University College Hospital, etc. New York: G. P. Putnam's Sons. London: Hodder & Stoughton. Vol. I., 388 pages, 1904. Vol. II., 382 pages, 1905. Price \$3.50 each.

It speaks well for the development of a specialty when a special pathology treating the lesions of but one organ is appearing in four volumes. Yet in the last decades so much work has been done along the line of the microscopic study of ocular lesions as is evidenced by turning to the contents of a number of the special journals devoted to the eye, that a literature on any one subject has sprung up which is often unwieldy and almost unmanageable. This work is therefore most timely and no one could be better qualified to successfully undertake this task than Mr. Parsons, who is well known by numerous contributions to scientific ophthalmology.

The work is divided into two parts; the first, now complete, is on the "pathological histology of the eye," and the second is to be on "general pathology of the eye." In Volume I., on the pathological histology of the eye, each part of the eye is taken up in turn, beginning with the lids, conjunctiva including bacteriology, cornea, sclera, iris, and ciliary body, then continuing in Volume II. with the lens, vitreous, choroid, retina, optic nerve, orbit, and lachrymal apparatus. Each part is introduced by a brief description of the normal histology and ends with a bibliography. The work is profusely illustrated with chiefly original photographs. These in the author's belief insure absolute fidelity. The illustrations are not all equally satisfactory, they sometimes lack clearness, and the details are often indistinct but they fulfil their purpose adequately. The author's style is lucid, uninvolved,

and succinct; tedious discussions are omitted. The work will be essential to all workers with the microscope and of value especially to all English-speaking ophthalmologists. We look forward with great interest to the appearance of the concluding volume.

A. K.

II.—*The Changes Produced by Inflammation in the Conjunctiva* (Hunterian Lecture R. C. S., 1905). By M. S. MAYO, F.R.C.S. John Bale Sons and Danielsson Lim., London, 1905. 179 pages. Price 10s. 6d.

This is an histological study of certain inflammatory changes in the conjunctiva. With the aid of Pappenheim's plasma stain the author has been able to trace the origin of mononuclear leucocytes and plasma cells in the conjunctiva and favors Whitfield's view that these structures are derived from endothelial and perithelial cells. After treating of the development, comparative anatomy, and condition of the conjunctiva at birth, the changes are minutely described which occur in each layer of the conjunctiva in inflammation. These extremely painstaking studies will be of great interest to all workers in microscopic anatomy. The subject of lymphoid tissue in the conjunctiva and of the formation of follicles is of value and interest also to the clinician from their connection with trachoma. According to the author there is no lymphoid tissue in the conjunctiva at birth; this arises subsequently from the endothelium as a response to some form of irritant. The description of trachoma is the one which is generally held. The follicles in follicular conjunctivitis and in trachoma differ inasmuch as in the former plasma cells preponderate and in the latter there is necrosis. In treatment of trachoma expression is indicated in the cases of follicular enlargements. In the subsequent treatment or in other stages of trachoma the author is an ardent advocate of the X-rays.

A. K.

ILLUSTRATING DR. BROWN'S ARTICLE ON "SYMPATHETIC OPHTHALMIA."

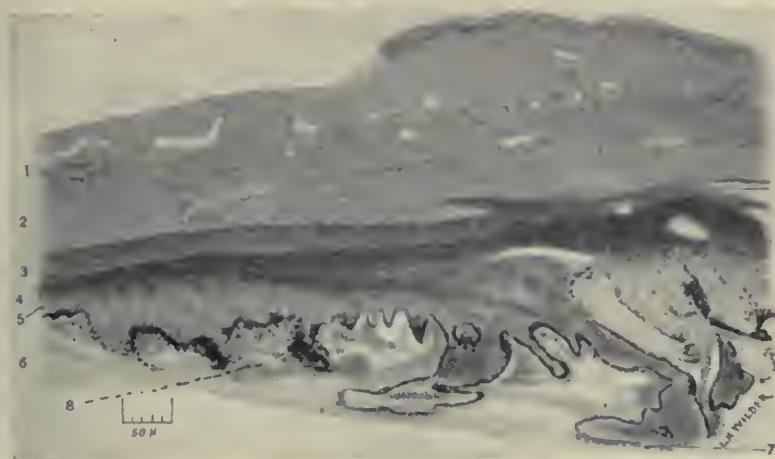


FIG. 1.

- 1.—Episclera.
2.—Sclera.
3.—Musculus ciliaris.
4.—Round cells.
5.—Epithelioid cells.
6.—Pigment epithelium.
7.—Intact unpigmented epithelium.
8.—Cell exudate.

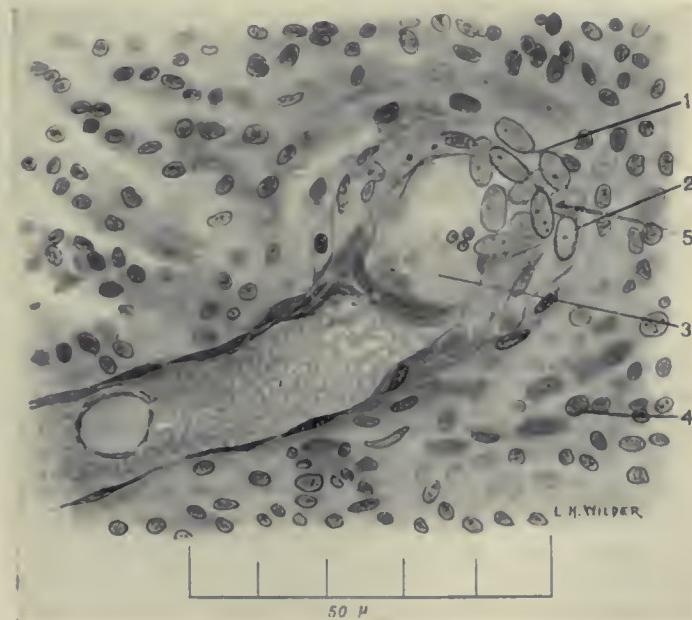


FIG. 2.

- 1.—Adventitial endothelium.
2.—Intimal endothelium.
3.—Blood cells.
4.—Round cells.
5.—Proliferated epithelioid cells.

ARCHIVES OF OPHTHALMOLOGY.

THE ANATOMIC CHANGES ("UVEITIS PROLIFERATIVA," FUCHS) IN THREE CASES OF OPHTHALMIA SYMPATHICA.¹

(With two figures on Text-Plate V.)

By E. V. L. BROWN, M.D.,

INSTRUCTOR IN OPHTHALMOLOGY, RUSH MEDICAL COLLEGE, IN AFFILIATION WITH THE UNIVERSITY OF CHICAGO; PATHOLOGIST, ILLINOIS CHARITABLE EYE AND EAR INFIRMARY, CHICAGO.

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I. INTRODUCTION.

ABOUT a year ago Professor Fuchs described, for the first time, an anatomic condition constantly found in the diseased eyes which cause sympathetic inflammation of the fellow eye. The lesion consists of an infiltration of all parts of the uvea with lymphocytes, giant

¹Read before the Section on Ophthalmology of the Philadelphia College of Physicians, January 15, 1907.

cells, and epithelioid cells, the last singly and in clusters. Of these, the lymphocytes are in no way different from those of ordinary inflammation and the giant cells are found in only half of the cases; the epithelioid-cell proliferation is, therefore, the only peculiar and unusual feature of the condition. These epithelioid cells arise from five sources, namely, ordinary connective-tissue cells of the uvea, the pigmented stroma cells, the adventitial and endothelial cells of blood-vessels and lymph spaces, from the endothelial cells normally present between the elastic lamellæ of the chorioidea, and, lastly, from the pigment-epithelium, especially that of the iris and corona ciliaris. In contrast with uveitis which does not cause sympathetic inflammation, there is in proliferative uveitis an entire absence of fibrinous exudate, polynuclear leucocytes and plastic adhesions between the iris, lens, and ciliary processes, although these conditions may co-exist. The one essential and characteristic process displays itself, therefore, *within* the confines of the uvea and *not upon* its surface, and is not a fibrino-plastic uveitis, as taught heretofore, but an infiltrative or "proliferative" uveitis. How constant and characteristic these findings are is shown in Professor Fuchs's study of his own material.¹ From among sections of 181 eyes removed for ophthalmia sympathica or fear of it in the past twenty years he selected, by microscopic study and without knowledge of the clinical histories, the sections of twenty-four eyes showing the proliferative uveitis; subsequent reference to his records showed a sympathetic inflammation in the other eye in every case except one, thus corroborating his anatomic diagnosis. The one case had a clinical history of sympathetic irrita-

¹Fuchs, E., "Ueber sympathisierende Entzündung (nebst Bemerkung ueber seroese traumatische Iritis)," mit Tafel XII u. XIII, Fig. 1-28, und 9 Figuren im Text. *Arch. f. Ophth.*, Band lxi., Heft 2, pp. 365-457, Sept., 1905.

tion only. Sixteen other cases of sympathetic irritation showed no signs whatever of proliferative uveitis in the enucleated eye.

The great significance of this work has as yet been hardly realized. If corroborated on other sides, it will mark a great advance in our knowledge of this disease. Clinically, we know little of ophthalmia sympathica—what causes it, why, how, or where it begins in the primary eye; it is, indeed, usually the result of a penetrating injury of the tunica fibrosa,¹ yet it is pretty widely accepted that sympathetic inflammation of the fellow eye may occur without any atrium of infection from without in necrotic sarcoma of the chorioidea. Much less do we know its path to the other eye, the time of its appearance, the general or local conditions which determine it. Finally, we cannot recognize the disease, as such, when it does appear in the other eye, for it is not essentially different clinically from other uveal inflammations. As Schirmer² says, "ophthalmia sympathica is at best only a probable diagnosis."

On the other hand, nothing any more definite is known as to its pathologic anatomy. If, therefore, a proliferative uveitis can be determined to be invariably present in true sympathetic inflammation, a sharp line of demarcation will be drawn pathologically between sympathetic inflammation and sympathetic irritation, and ophthalmia sympathica be taken with one stroke from the domain of the clinician, where, so far, it has been best known, and established first as an anatomic entity, as it should be.

¹ Use is made in this article of the Basle Anatomical Nomenclature [B N A]. An extended treatise on this international terminology by Professor Barker of Johns Hopkins is soon to be published by Blakiston & Sons, Philadelphia.

² "Sympathische Augenerkrankung," *Graefe-Saemisch Handbuch*, 2 Auflage, vi. Bd., ii. Abt., Kap. viii., p. 54, Leipzig, 1900.

Having had opportunity to study three cases which substantiate Professor Fuchs's findings, I submit them at this time, along with a review of the literature of similar findings in the eye and analogous epithelioid-cell proliferations in other parts of the body.

II. AUTHOR'S CASES.

CASE I. Mary Quinn, age eleven, admitted to the service of Dr. H. W. Woodruff at the Illinois Charitable Eye and Ear Infirmary, Oct. 16, 1903.

CLINICAL HISTORY. Three days before, the right eye had become swollen and painful. Examination revealed a profuse conjunctival discharge containing gonococci, and lid oedema and bulbar chemosis so extensive as to reduce the vision to nil. Haziness of the cornea developed on the fifth day, and led to ulceration with perforation on the fifteenth day; on the eighteenth day a portion of prolapsed iris was removed; sixty-one days after the beginning of ophthalmia gonorrhœica in the right eye and forty-six days subsequent to the perforation of the cornea the left eye became painful to the light and the vision reduced to $\frac{1}{12}$; an irregularly dilated pupil and precipitates on the facies corneæ posterior were found, and a diagnosis of iritis sympathica made. The right eye was enucleated forty-five days after the perforation of the cornea and nine days after the beginning of the inflammation in the second eye. The sympathizing eye ran the course of a severe destructive iridocyclitis plastica, despite prolonged medical and surgical treatment. After a lapse of three years the patient was practically blind, vision reduced to hand movements, the cornea flattened, the camera anterior shallow, the iris discolored and very atrophic; posterior synechia is complete, the lens cataractous, the tension lowered.

PATIOLOGIC EXAMINATION (Lab. No. 787). *Gross Findings.*—The lower two-fifths of the cornea is opaque and covered by a two-millimetre broad pannus regredens; the iris is adherent to the cornea throughout this area; its lateral half is very dark in color; the pupilla is vertically oval with a re-entrant angle of posterior synechia below; T + 3.

Horizontal Section shows the retina detached in the inferomesial quadrant near the papilla, and the corpus vitreum opaque.

Microscopic Findings.—Nearly the entire bulbus was cut into sections 25 micra thick and these stained at some 30 levels with hematoxylin and eosin, Van Gieson, Mallory's connective-tissue stain, methyl blue, Unna's polychrome methyl blue, and depigmented by Alfieri's method. Sections through axis 180° (*vide* section No. 7) above the region of the ulcer show the outer tunics to be of nearly normal contour and thickness except for a slight flattening of the central third of the cornea and a corresponding thinning to one-half here and to five-sixths at the limbus. The episcleral tissue is considerably increased in bulk and numerous mast cells are scattered about in the neighborhood of the vessels. The spatium pupillaris is three millimetres wide; the camera anterior is divided into two symmetrical halves by anterior synechia of the margo pupillaris; the lateral half contains fibrin. Only the lateral two millimetres of the cornea approach the normal in structure; elsewhere the anterior half of the substantia propria shows a marked increase of fixed cell nuclei and a broad tract is undergoing transformation into dense wavy connective-tissue bundles in the mesial half; the new tissue is devoid of vessels except just beneath the epithelium, where there are a few large vessels; the adjacent scar tissue has entirely replaced the membrana Bowmani except for a central millimetre; however, large filled vessels surrounded by cell-mantels course entirely across the cornea in the lamellæ just back of the new connective-tissue zone. The overlying epithelium shows a uniform reactive basal-cell increase, thickening the layer one-half; many round cells are strewn through this new epithelium. The endothelium of the membrana Descemeti is everywhere present though frequently hidden by low clumps of mononuclear round cells and pigment detritus. In the spatium pupillaris the cells form a layer two to ten cells thick along the facies cornea posterior, continuous on each side with the infiltration of the iris stroma. The iris is permeated throughout with cells, increasing its width one-fifth in the lateral half; the infiltration

is mainly disposed in the posterior half of the tunic, although in the three zones where vessels are cut longitudinally the infiltration reaches the facies anterior iridis. The cells infiltrating the iris and corpus ciliare are of three types. viz.: (1) small, heavily staining, mononuclear round cells with a very narrow rim of protoplasm; (2) larger round cells with much more cytoplasm and an eccentrically placed, grossly granular, heavily staining nucleus; and lastly, (3) a cell with a very large, ill-defined, frequently indistinguishable body, staining very faintly with eosin and containing a large, faintly staining, clear, vesicular, oval or elongated nucleus measuring 6 by 12 and 4.5 by 17.5 micra respectively, and one or two tiny nucleoli which stain well. The types of cells are, respectively, ordinary small mononuclear leucocytes, plasma cells, and epithelioid cells; they are found disposed throughout the uvea of Cases II and III as well, and form the component cells of the typical proliferative infiltration; giant cells, also, are found through the anterior uvea of Cases I and II, but since they are inconstant and always made up of epithelioid cells massed in a common cytoplasmic body they deserve no special consideration. The lateral half of the iris is much more densely infiltrated with these new cells than is the mesial half; plasma cells predominate in the stroma immediately over the sphincter, whereas about the vessels the cells are almost exclusively lymphocytes; toward the margo ciliaris iridis more and more epithelioid cells are found scattered through the tissue and at the very root they become so numerous that they form a large axially placed oval area, one millimetre long and one-third of a millimetre wide; here the mass has broken through the posterior pigment-epithelium in a very characteristic manner, and has filled in the angle of the camera posterior between the root of the iris and the corona ciliaris, at the same time displacing an overlying zone or node of round cells to the fore-surface of the iris. The mesial half of the iris, while not widened, is infiltrated by the same cells throughout its posterior layers; the pigment-epithelium is irregularly thickened and thinned on both sides. The corpus ciliare is normal in position although it is widened one-fifth lateralward by cell-infiltration of the corona and

orbiculus ciliaris. The musculus escapes entirely, or rather is compressed into a dense, narrow band 0.08 millimetre wide, representing only about one-fifth of its normal width. The continuation of the orbiculus forward between the musculus ciliaris and the corona shows the most extensive and indeed the characteristic changes (Text-Plate V., Fig. 1); just internal to the musculus is a ten- to twenty-cell-wide zone of lymphocytes running the entire length of the plate and continuous forward with the infiltration of the anterior part of the iris. Viewed with the low power, the stroma central to this round-cell band presents a series of striking, clear-staining areas or nodes more or less confluent, which, with higher magnification, are seen to be made up of clusters of the faint-staining epithelioid cells; among them are scattered round cells and stroma pigment. When these clear, oval areas are studied under oil immersion the first impression that very few cells are present is quickly dispelled, for on accurate focusing epithelioid-cell nuclei are seen dispersed throughout the whole field in every conceivable position—so numerous in fact that one is scarcely able to find a nucleus not in contact with neighboring nuclei. These clusters are found, in various sections, throughout the entire anterior uvea from the root half of the iris back to the chorioidea. Toward the musculus the clear-staining zone presents irregular crenations and angular extensions into the round-cell zone outside of it, while on the vitreous side it spaces apart and breaks through the pigment-epithelium; still central to this broken-down pigment-epithelium is a narrow band of the granulation tissue, bounded by the inwardly displaced, intact, unpigmented layer of the epithelium. In this particular section the epithelioid-cell zone extends only one-third the distance from the iris to the ora serrata; from this point back the orbiculus is infiltrated with lymphocytes and scattered epithelioid cells only; a homogeneous membrane, apparently continuous with the lamina basalis chorioideæ, lies just external to the pigment-epithelium back of the epithelioid-cell zone. The coronal processes and plicæ are matted together and their stroma is little in evidence, so little so that the bases of the pigment-epithelium almost touch each other. The corpus ciliare on

the mesial side shows exactly the same relations; namely, the stroma zone, representing the continuation forward of the orbiculus ciliaris, is widened—from a narrow 1.04mm band to a zone measuring 0.57mm —and this at the expense of the musculus, which is compressed to one-sixth of its normal width; and, just as on the other side, this widened orbiculus consists of two parts: an outer, heavy-staining, round-cell zone, and an inner, clear-staining, epithelioid-cell zone extending down to and through the broken pigment-epithelium; central to the pigmented epithelium is a narrow zone of mixed round- and epithelioid-cell granulation-tissue, which detaches the unpigmented epithelium; the corona ciliaris is slightly compressed, its processes and plicæ closely apposed to one another; the spatia zonulare is infiltrated with round cells on both sides.

At its junction with the chorioidea on each side the cell-infiltrate of the corpus ciliare passes imperceptibly into that of the chorioidea; this latter tunic is everywhere *in situ*, limited by an intact lamina basalis and an almost unchanged retinal pigment-epithelium; its width is increased to about twice the normal, measuring on an average 0.05mm ; near the papilla it measures 0.15mm in comparison with the normal width of 0.10mm . The widening is due exclusively to an infiltration of the heavy-staining round cells; neither epithelioid cells nor giant cells are anywhere to be found. The cells permeate all layers, yet the lamina choriocapillaris is least affected. The vessels, partly collapsed, partly filled, stand out by their thick, white walls; while the perivascular spaces do not show special "cell-mantels," neither can it be said that the cells are any less thick immediately about the vessels. The lens is normal in position; beneath the capsule of the anterior pole the endothelium is proliferated into a band three to four cells wide. The retina shows an artificial amotio 2.5 by 12 millimetres lateralward, and a lower, pathologic amotio mesial to the papilla; an increase of glial cells and fibres is seen in the nerve-fibre layer, widening it about three times; otherwise the layers are practically normal, although somewhat folded mesial to the papilla. The vessels throughout the retina show wide, dense cell-mantels. The opticus

and its sheaths are normal, except for a slight increase of glial cell nuclei. Careful staining for micro-organisms gives a negative result.

SUMMARY. Case I presented, *clinically*, a conjunctivitis gonorrhoeica with an *ulcus perforans* and prolapsus iridis, followed by an *irido-cyclitis plastica*, eventuating in severe destructive *irido-cyclitis sympathica*; and, *anatomically*, a healed corneal defect, keratitis interstitialis, an active *iridocyclitis fibrino-plastica*, cataracta capsularis anterior, *irido-cyclitis proliferativa* (Fuchs), and choroiditis infiltrativa.

CASE II. Annie Wachsmucki, age six, a patient of Dr. Oscar Dodd's at the Illinois Charitable Eye and Ear Infirmary, entered the Hospital May 25, 1906.

CLINICAL HISTORY. The right eye had been struck by a piece of flying glass three days before. Examination revealed a healed cut extending from the centre of the cornea to the lateral limbus of the right eye and an iris prolapse and incarceration; the camera anterior was shallow, the pupil oval, the ciliary body markedly injected and vision reduced to the perception of light. Four days after the injury the iris prolapse was abscised with some loss of the vitreous. On the thirty-second day the left eye showed signs of sympathetic irritation, whereupon the injured right eye was enucleated; slight improvement in the condition of the left eye was noted a week later, but examination on the forty-sixth day showed a marked, although a painless, *irido-cyclitis plastica*—"muddy" iris, complete posterior synechia, pigment on the lens capsule, localized ciliary tenderness in axes 75° and 255° , precipitates on the facies cornea posterior, and prompt staining of stroma areas with fluorescin; no view of the fundus was to be had. On the fifty-seventh day the findings were greatly changed; the facies iridis anterior was found divided into sectors by radial furrows sunk deeply into its surface; they coursed from the pupil border to the margo ciliaris and were supposedly due to cicatricial contraction of a retro-iridic connective-tissue mass; the fore-bulging folds of the iris stroma were quite vascular in the region of the circulus minor. The iritis

gradually subsided under treatment, and two months after the sympathetic inflammation began there was no external evidence of active inflammation, although fluorescin still stained many small areas in the lower part of the posterior corneal stroma; vision was only hand movements.

PATHOLOGIC EXAMINATION. (Lab. No. 1085.) *Gross Findings.*—A healed corneal wound runs from the centre lateralward to within three millimetres of the limbus, where it divides into a superior and inferior ramus; the camera anterior is shallow, the spatium pupillaris filled with a whitish mass, the iris atrophic.

Coronal Section of the bulbus shows an exudate in the anterior vitreous—the rest of which is fluid,—cataracta membranacea, a thin white film covering the corona ciliaris, and multiple amotiones retinae.

Microscopic Findings.—Both the anterior and posterior halves were sectioned serially in the horizontal plane from above the region of the lens down to a corresponding level of the bulbus below. Every fifth or tenth section was stained by the same solutions as were used in Case I. Sections through the centre of the pupilla and papilla optica (*vide* No. 10 and No. 100 ant., and No. 170 post.) show the eye to be of normal contour, except for a central healed corneal wound whose lateral lip overlaps the mesial one somewhat, and a slight tumefaction at the sulcus sclerae due to less advanced healing of a second, broad, completely-penetrating wound leading directly to the fore-surface of the *musculus ciliaris*. The cornea is uniformly thinned to nearly one-third the normal; the sclera measures 0.7 millimetre anteriorly and 0.6 millimetre posteriorly. The camera anterior is entirely obliterated by the prolapsed iris except for a 0.2 by 1.5 millimetre lateral angle-slit. The tunic is thrown forward on both sides, fused with the facies corneæ posterior and transformed into a 1.5 millimetre-broad granulation-tissue mass; running through the centre of this mass is the broken line of the posterior pigment-epithelium; one-quarter of the way from the lateral root, the pigment line turns forward into the posterior angle of the healed, marginal wound of the cornea in which it and the iris stroma are incarcerated. Part of the

collapsed capsula lentis and some of its epithelium and considerable substantia corticalis can be made out mesial to the centre at the back part of the granulation-tissue mass. The corona ciliaris is drawn forward on both sides and the processes and plicæ matted together back of the root of the iris. The spatia zonular and zonula ciliaris are solidly filled in on the lateral side by partly organized granulation tissue, and by scattered plasma cells, mono- and poly-nuclear leucocytes on the mesial side. The main body of vitreous is free from cells except well forward where there are many stellate fibroblasts.

The infiltration of the corpus ciliare deserves special attention. The main body of the musculus is compressed in its outer half and spaced apart by scattered round cells in its central half; on the whole, the bulk of the musculus is not much reduced as was the case in Case I. Central to the musculus is a five- to ten-cell-wide band of densely-packed and heavily-staining leucocytes running the entire length of the body and continuous forward with the infiltrate in the forepart of the iris and continuous posteriorly with the cell mass in the chorioidea. Still central to the round-cell band is a clearer-staining zone in the orbiculus, where, as in Case I, the main infiltration with epithelioid cells is found, widening it to twice the normal and displacing and breaking through the pigment-epithelium on the vitreous side. In one area the epithelioid cells seem to have been derived from proliferation of the endothelium of a blood-vessel (Text-Plate V., Fig. 2). The unpigmented epithelium is detached from the pigmented layer by a ten- to fifteen-cell-wide granulation-tissue mass on both sides. At the root of the iris the pigment-epithelium is very much broken-up on each side by nodes of round- and epithelioid-cell granulation tissue, in the centre of which are seen clumps of pigmented cells; here, too, one finds very many epithelioid giant-cells, all of them so heavily pigmented that they can be recognized as such only after the specimen has been depigmented. The chorioidea is everywhere *in situ* and its outer and inner limits undisturbed. Although in many sections the anterior part of the chorioidea is normal, in

others the whole tunic is widened to a thickness of from 0.05 to 0.13 micra by an infiltration of round cells; epithelioid cells and giant cells are not present; the cell-increase is very uniformly distributed throughout the entire expanse of the chorioidea—the choriocapillaris only being free from change. The cells are much less closely disposed than in Case I., where scarcely any tissue of the chorioidea itself could be seen. The retina is everywhere normal, except for an artificial detachment and folding near the disk, and a slight glial-cell increase in the nerve-fibre layer. Well forward there are a few perivascular cell-mantels but no other evidences of an inflammatory process. The papilla is normal except for glial-cell increase. No micro-organisms can be found in any of the tunics.

SUMMARY OF CASE II. *Vulnus perforans* leading to iridocyclitis plastica and causing a severe sympathetic inflammation of the fellow eye; *anatomically*, iridocyclitis fibrino-plastica and *proliferativa*, and choroiditis infiltrativa.

CASE III. A. Oelish, age fifty-three.

CLINICAL HISTORY. About six months ago, the right eye of the patient was struck by a piece of a steel nail which penetrated the *regio ciliaris* causing *cataracta traumatica* and an *iritis plastica*, the latter lasting about six weeks and resulting in *seclusio pupillæ*. During the last three months the eye had been "quiet." Feb. 6, 1906, a right combined cataract operation was performed; ten days of normal healing and steadily improving vision followed, but a recurrent irido-cyclitis plastica with pupillary exudate supervened, accompanied by severe spontaneous pain and great ciliary tenderness on palpation. The eye was removed on the thirty-fourth day after the cataract operation. On the fifth day after the removal of the eye *iritis plastica* with ciliary injection and pain developed in the fellow eye and two days later posterior synechia was complete, although vision remained $\frac{1}{2}$. April 11, 1906, three weeks later (thirty days after the enucleation of the fellow eye and sixty-four days after the cataract extraction), pain and redness had

gradually disappeared, leaving the vision $\frac{1}{2}$. May 20, 1906, the iris was partially adherent to the lens capsule, the eye without irritation, and vision $\frac{2}{3}$.

PATHOLOGIC EXAMINATION. (Lab. No. P. 207.) *Gross Findings.*—Inspection shows a slightly ectasiac healed wound through the upper marginal third of the cornea, and a tag of iris incarcerated in the lateral wound-angle; behind the corneal wound is an eight-millimetre coloboma iridis; the coloboma is spanned and filled by a smooth, dense, opaque, yellow exudate mass above a two-millimetre-wide, irregular pupilla; at the pupilla the camera anterior is much deeper than elsewhere; the iris stroma also seems defective through a zone running from the pupilla down and lateralward to the sclera.

The *interior*, seen after the removal of a mesial calotte, shows the corona ciliaris to be flattened; a chocolate yellow, viscid fluid lies just back of the site of the lens; the lens itself is absent. An amotio retinæ extends from the papilla in a straight line to the ora serrata on each side.

Microscopic Findings.—Serial sections of the bulbus in the vertical plane throughout the site of the lens were stained as in Cases I and II. Sections through the centre of the pupilla and papilla parallel to axis 90 (No. 146) show the anterior tunica fibrosa thinned to one-half and the central three-fourths of the cornea collapsed. The superior limbus corneæ just beyond the membrana Bowmani is the seat of a well-knit cicatrix permeated by an oblique zone of proliferated fixed-cells and marked externally by a mass of tumefied episcleral granulation tissue; the wound tract is continuous internally with a short plug of round cells which spreads out as a tenth-millimetre-broad band and occupies the position of the iris from its cut ciliary root above to the pupillary border of the iris below. The capsula lenticularis is almost completely collapsed and lies directly behind this granulation-tissue zone in one half and behind the normally placed iris in the other half. No retinal pigment can be found upon the capsule. The operative defect in the membrana Descemeti measures one-eighth of a millimetre; a small mass of iris stroma pigment is incarcerated in the loose tissue which spreads apart the inner aspect of the wound. The adjacent

corona ciliaris is low and the folds rounded together. The sinus-angle below is narrow, although patent, and filled with blood. The lower half of the iris and corpus ciliare shows only a slight round-cell infiltration. This section shows a considerable cell-increase, especially above in the vessel-bearing stroma breaking the pigment-epithelium. Other sections mesialward (notably No. 40) show more marked infiltration of the entire corpus ciliare with round cells, among which plasma cells greatly predominate, and, characteristic-ally, a distinct proliferation of epithelioid cells in the prolongation of the narrow orbiculus stroma between the epithelium and musculus. Many of these epithelioid cells are very evidently derived from the intima endothelium of small vessels; others lie free among the stroma pigment-cells and numerous plasma cells. These cells are only seen in their true relations and number by the use of the oil immersion. Toward the muscle they can be easily confounded with the muscle nuclei, but they have oval ends in contrast with the distinctly pointed ends of the muscle nuclei. The epithelioid cells are nowhere numerous enough to form clusters visible with the low power, and the granulation-tissue has nowhere broken through the pigment epithelium as in Cases I and II. The chorioidea is everywhere *in situ* but infiltrated throughout with round cells in all layers down to the choriocapillaris, which is absolutely free, although perhaps overfilled in some of the sections studied. The tunic is very gradually thickened from before backward to four times the normal, near the papilla ($\frac{4}{5}$ millimetre—Greeff). And the nutrition of the outer layers of the retina has suffered because considerable pigment-epithelium and its granular debris has clung to the detached retina. The stroma pigment is very abundant; giant cells are nowhere to be found in depigmented sections. The retina is detached from the papilla to the ora serrata, both above and below, yet, though slightly thinned, shows no cell-mantels or other evidence of inflammation. There is a slight increase in the number of glial cells in the opticus. The anterior vitreous shows a broad hemorrhagic band between the *oræ serratæ* *retinæ*. Micro-organisms are not found in any of the tunics.

SUMMARY OF CASE III. Vulnus perforans with irido-cyclitis plastica, followed by healing; a cataract operation performed after months of quiescence led to a recrudescence of the inflammation in the one eye and an irido-cyclitis sympathica in the other eye. Anatomic study showed irido-cyclitis plastica and *proliferativa* and chorioiditis infiltrativa.

III. COMPARISON WITH FUCHS'S CASES.

The three cases reported above agree with those reported by Professor Fuchs in all essential features, namely, a cell proliferation *within* the confines of the uvea greatly overshadowing any fibrino-plastic exudate *upon* its surfaces, granulation-tissue masses breaking through the pigment-epithelium and only detaching the unpigmented epithelium, the apices of the coronal processes free from adhesion although their bases are matted together, chorioidea infiltrated with round cells —the lamina choriocapillaris least affected, the pigment-epithelium undisturbed, the lamina basalis everywhere intact, no masses of pus cells in the vitreous bordering the uvea,¹ and, lastly, the retina absolutely uninvolved except for cell-mantels about the vessels. Epithelioid cells in clusters or singly were found in every case and, with Fuchs, I was able to trace their origin to the endothelium of vessels in all three cases, as well as to the fixed connective cells of the stroma and (less certainly) to the epithelium of the pars ciliaris retinæ in Cases II and III; none of my specimens shows conclusively that the epithelioid cells may come from the chromatophores. Epithelioid cells were not found in the chorioidea of any of my cases, so that I am in no way able to confirm or deny a

¹I. e., no "Endothalmitis" (Fuchs). *Vide "Anatomische Veränderung bei Entzündung der Aderhaut"* (mit Taf. XI und XII, Fig. 1-21 und 5 Figuren im Text), *Arch. f. Ophth.*, Bd. lviii., Heft 3, pp. 391-429. 1904.

proliferation of these cells between the elastic lamellæ of this tunic. Giant cells were inconstant.

My cases all show a considerable relation between the severity of the inflammation in the sympathizing eye and the intensity of the proliferative uveitis found post-mortem. For, on the one hand, Case I clinically suffered a destructive irido-cyclitis sympathica with loss of vision except for the perception of light in the second eye, Case II ran a less severe course with retention of vision for large objects, and Case III experienced an irido-cyclitis of very short duration without loss of vision; while, on the other hand, anatomically, Case I, taken out nine days after the outbreak of inflammation in the second eye, showed well-developed clusters of proliferated epithelioid cells, Case II, taken out three to five days after the onset of inflammation in the sympathizing eye, showed less extensive areas, and Case III, taken out five days before the appearance of any trouble in the other eye, showed the least marked, though unmistakable, changes. However, this relation between the severity of the clinical symptoms and the extent of the anatomic changes in these three cases must be looked upon as purely accidental, for in the thirty-three cases available for such a comparison in Professor Fuchs's series no such relation obtained.

Only one of my preparations shows fibroblasts within the uvea and other evidences of the more advanced or final stages in the process described by Fuchs; these consist of a decrease in the number of the lymphocytes, epithelioid cells, and giant cells, and eventually their complete disappearance; in their place there develops a densely organized connective tissue closely resembling the sclera. From the study of one particularly instructive case, Fuchs is convinced that the epithelioid cells become transformed first into young fibroblasts through elongation of their protoplasmic processes and then into adult

connective-tissue fibres, so that the whole process begins and ends within stroma cells, *i. e.*, they proliferate into epithelioid cells and these in turn develop into stroma fibres. Necrosis or liquefaction of the infiltrating cells does not occur.

IV. REVIEW OF SIMILAR FINDINGS IN THE LITERATURE.

No one previous to Professor Fuchs has even postulated an anatomic finding for sympathetic ophthalmia in any way characteristic or unique for either eye. The recent exhaustive series of Ruge teaches that the condition is a fibrino-plastic uveitis differing in no way from the ordinary traumatic, non-sympathetic uveitis. Yet there are many reports which show that the essential proliferative inflammation has been seen and recognized heretofore. In gathering together these cases, many of which are referred to by Professor Fuchs,¹ I have taken one thing only as an absolute and final criterion of uveitis proliferativa, namely, *a proliferation of epithelioid cells in clusters, or singly, within the confines of the uvea* in eyes which have caused actual sympathetic inflammation of their fellows. In all, twenty-one such cases have been reported by Pagenstecher, Krause, Gunn, Brailey, Schirmer, Pincus, Uhr, Blascheck, Ginsberg, Dalen, Zentmayer, and Ruge. The earliest case noted—that of Pagenstecher—is open to much question and the findings may therefore be best referred to as only possibly those of proliferative uveitis. I have accepted the cells described by Brailey as “corpuscular elements” to mean epithelioid cells. Otherwise the quotations, which follow, beginning with the excellent description by Krause in 1881, detail clearly and unmistakably epithelioid-cell proliferations in sympathetic ophthalmia.

¹ Those of Krause, Schirmer, Blascheck, Dalen, and Ruge.

1879 PAGENSTECHER: Chorioidea. "The entire meshwork is plainly lined with endothelium. In the widest meshes the cells are very large, have finely granular contents and one or more nuclei. In the finest meshes, and in the region of the ciliary body, as well, the character of the endothelium changes and the nucleus is more evident, while the cell contour becomes very faint and almost imperceptible. The cells of the wide meshes are broad; the others are narrower."

1881 KRAUSE: "When one looks at specimens of the chorioidea stained with hematoxylin or alum-carmin with the loupe, a peculiar mottled appearance is noted. While the greater part of the chorioidea has taken on a dark color, there remain small, rounded, sometimes confluent areas, with elongated districts, which stain very weakly. With a higher power one sees that the heavily stained areas consist entirely of round cells whose nuclei have everywhere taken a very deep stain. In the weakly stained parts one perceives a special kind of cell; its nucleus is readily distinguished from that of the round cells by its elongated form, its vesicular appearance, and in that it usually contains one or more nucleoli staining intensely with hematoxylin; these nuclei stain very weakly, whereas the nuclei of the round cells stain very deeply. The cell protoplasm stains very deeply with eosin. The cells for the most part resemble throughout epithelioid cells; usually they have two nuclei of the nature above described, although sometimes only one, and are further distinguished from round cells by their great amount of granular protoplasm. They are two to four times the size of pus cells, which measure 0.006 to 0.008 millimetres. Another variety of these cells is of much greater dimensions and has a larger number of nuclei, even representing transition to actual giant cells; their diameters vary from 0.02 to 0.57 millimetres, and the number of nuclei up to as many as twenty-eight, being mostly disposed at the periphery of the cell. I have found these epithelioid and giant cells throughout all parts of the ciliary body and iris; they are often richly permeated with pigment granules, which is seldom the case in the chorioidea."

1886 GUNN: "Choroid enormously thickened on either side of optic disk; it is made up of ill-defined fibrous tissue in which are embedded, especially towards its outer part, large ill-defined clusters of faintly staining nuclei."

1887 BRAILEY: "Microscopically the choroidal thickening consists of very numerous small corpuscular elements embedded in a basic substance of ill-defined fibrous structure, approximating in general appearance an imperfectly developed white fibrous tissue. The first are usually small (diameter about .004 millimetre), rounded, and tolerably deeply stainable with logwood, or they may be somewhat larger in size (up to .006 millimetre), more faint in outline and in staining capacity, more tending to oval in shape, and with their dot-like nuclei more easily recognizable. In certain portions of the mass, the smaller, more deeply stained elements are almost exclusively found and are more closely packed, while these parts shade gradually into other regions where the corpuscular elements are mainly of the larger, fainter, less-staining variety. The intercorpuscular fibrous substance is more abundant where the larger cells are the more common. It never exhibits distinct, minute, or long-extended fibrillation, but appears to be made of faint, coarse, short, hardly separable fibres, in many cases oval in shape, with which many of the corpuscular elements are clearly in intimate association. Many bodies are seen which correspond with the giant-cells of tubercle. These are .03 millimetre or more in diameter, gelatinous looking, very feebly staining, and have embedded in them, often in a circle just within their margin, faint, brightly refracting, corpuscular elements of evidently the same nature as the large faint variety described above."

1892 SCHIRMER: Case XV. Iris. "Here and there lie groups of epithelioid cells mixed with granular pigment."—Chorioidea. "In certain places an arrangement in nodes can be clearly recognized. Among them I find here and there the same epithelioid cells as in the iris." Case XVII. "In the middle layers of the chorioidea lie groups of epithelioid cells which are to be distinguished from the surrounding lymphocytes through their large, strongly eosinophilic protoplasmic bodies and large vesicular nucleus with its

nucleolus. Hematoxylin stains them much more weakly than it does the nuclei of the round cells. The eosinophile cells are several times larger than lymphocytes and contain at times two giant cells. In the iris and ciliary body I found only a few such cells."

1894 PINCUS: Ciliary body. "Among the leucocytes one finds numerous cells, arranged in irregular groups, with protoplasmic bodies staining heavily with eosin and nuclei which are larger, more vesicular, and take up the hematoxylin less readily than do the nuclei of the leucocytes. Moreover there are groups of the above described epithelioid cells in the chorioidea to be made out even with the low power as reddish areas poor in leucocytes."

1898 UHR. Case I.: "Many nests of very polymorphous epithelioid cells lie in this round-cell tissue; between them are often giant cells, sometimes with numerous marginal nuclei. The epithelioid cells are disposed by preference in the neighborhood of the larger vessels, at times close to them, and rather toward the inner side of the infiltrate." Case II. "Here, also, mononuclear round cells predominate; between them lie a few epithelioid cells, and here and there clearer cells in part filled with finely granular pigment and showing second nuclei." Case III. ". . . Strikingly numerous epithelioid cells are found, especially near the posterior hole. Here they frequently form nests. . . ."

1900 SCHIRMER: "The essential finding, identical in both eyes, is a thickening of the entire uveal tract by a dense cell-infiltration which consists of mononuclear round cells and sparse epithelioid cells."

1903 BLASCHECK: "In the layer of the larger vessels one finds several clusters of sparse epithelioid cells and large well-developed giant cells, partly with the Langhans nuclear arrangement, partly with irregularly disposed nuclei."

1903 GINSBERG: "In a case of iridocyclitis causing sympathetic ophthalmia I saw nodes of epithelioid cells, in the centre of nearly every one of which lay a pigmented giant cell."

1904 DALEN. Case I.: "The cells are for the most part mononuclear leucocytes; here and there one also finds small groups of epithelioid cells." Case II.: "In the centre of the nodes are clear areas consisting of epithelioid cells."

1904 RUGE. Case III.: "Nests of epithelioid cells and individual giant cells are found in the uvea as well as in the new granulation tissue." Case IV.: "In this new (iris) tissue, as well as in the ciliary body, giant cells and epithelioid-cell-nests are found." Case V.: "Noteworthy is the presence of epithelioid-cell-nests in the chorioidea and giant cells in the chorioidea and granulation tissue of the iris and ciliary body." Case VI.: "In the fore part of the bulb are epithelioid cells; they lie principally under the pigment epithelium and are interspersed with a few giant cells of the Langhans type." Case VII.: "It is noteworthy that epithelioid-cell-nests and giant cells occur in the inflamed tissue, without conditioning a marked deposition of round cells to the part."

1905 ZENTMAYER (Pathologic study by Dr. Shumway): "The iris and ciliary bodies are entirely destroyed and can be recognized only by the clumped masses of pigment with which the cellular mass is infiltrated which fills up the interior of the eyeball, and is being converted into organized tissue. To some extent this mass is composed of pus cells. These are particularly prominent on one side in the neighborhood of the ciliary body, and from here a purulent collection surrounds and infiltrates the processes. Elsewhere and in the position of the choroid, the inflammation has more of a plastic character, the cells being mononuclear in type; with them are many endothelial cells, and in certain localities, especially in the posterior half of the eyeball, a great many giant cells (Fig. 1)."

V. EPITHELIOID-CELL PROLIFERATION IN INFLAMMATORY CONDITIONS IN OTHER PARTS OF THE BODY.

A number of writers have described round-cell infiltration and epithelioid-cell proliferation in various acute and subacute inflammations, mainly non-suppurative in character, in other parts of the body. Among these

are epithelioid-cell proliferations in the kidneys in nine cases of acute non-suppurative interstitial nephritis in scarlet fever and typhoid (Councilman, 1897), in the meninges of thirty-five cases of epidemic cerebro-spinal meningitis (Councilman, Mallory, and Wright, 1898), in the lymphoid tissues of the ileum in nineteen cases of typhoid fever (Mallory, 1898), in the spleen, lymph nodes, and lymphoid tissues generally throughout the body in twenty-three cases of scarlet fever (Pearce, 1899), and in ninety-five cases of focal necrosis of the liver in a wide variety of diseases but chiefly in acute infectious diseases (Mallory, 1900). These reports are mentioned because many of them detail proliferations of epithelioid cells in clusters or singly *within* the anatomic confines of a part, and are strikingly similar to the proliferative uveitis described by Fuchs. They are probably due to the same general cause, namely, reactive proliferation of a special type of cell in the presence of organisms or toxins.

VI. DIFFERENTIAL DIAGNOSIS.

The organism causing sympathetic ophthalmia must belong to the granulation-tissue-producing group, as pointed out long ago by Hirschberg,¹ so that the proliferative and infiltrative uveitis of sympathetic ophthalmia must be differentiated from that of syphilis and tuberculosis; and, theoretically, at least, this distinction should be readily made by the lack of necrosis in syphilis and from the absence of the tubercle cell-arrangement and

¹ "We observe that the anatomic study of the fresh tissue in the injured eye reveals a certain similarity with tuberculosis (giant cells, granulation tissue); so we will, of course, do well to suspect the presence of a micro-organism (a bacillus) which produces granulation-tissue-proliferation as the cause of sympathetic eye disease—not however, a pus-producing organism (a coccus), although the three-to-twelve-week developmental period of the disease agrees with that conception." *Cent. f. p. Augenheilk.*, 29 Jahrgang, p. 80, 1895.

caseation in tuberculosis. In actual laboratory routine, however, the question from this time on will be whether or not an eye shows changes indicating sympathetic inflammation or ordinary traumatic uveitis. Here the findings lie between those of the infiltrative-proliferative uveitis of sympathetic ophthalmia, and those of endophthalmitis, including fibrino-plastic inflammation, with or without pus formation.¹

The fibrino-plastic form is characterized by cell- and fibrinous transudate in the anterior and posterior chambers and in the periphery of the vitreous body, binding the iris to the lens by synechia, matting together the apices of the ciliary processes and permeating the retina, yet leaving the chorioidea, ciliary body, and iris stroma uninvolved. The non-sympathetic process displays itself most markedly by abscess formation in the anterior vitreous and spreads out over the uveal and retinal surfaces, whereas in the proliferative uveitis of sympathetic ophthalmia the process begins *within* the confines of the stroma of the chorioidea, ciliary body, or iris, long remains confined to its boundaries, and only breaks through its inner limits to encroach upon the vitreous and aqueous bodies when the process is most extensive. The final differentiation, however, will be made upon the presence of epithelioid-cell proliferation, singly or in clusters, within the uvea of the eye causing sympathetic inflammation and the entire absence of this proliferation in ordinary fibrino-plastic uveitis.

While each condition can and does occur independently, the ordinary fibrino-plastic inflammation usually complicates proliferative uveitis, because there is an atrium of infection from without, either a wound, accidental or

¹ "Serous" irido-cyclitis, too, comes in here as a third possibility. In this same article Fuchs contributes an anatomic study of this condition—comprising three cases, all showing a well-marked infiltrative uveitis without epithelioid-cell proliferation and almost no fibrino-plastic uveitis.

operative, or a perforating ulcer resulting in a mixed infection, except in rare instances. It is, therefore, to these cases of proliferative uveitis—pure and uncomplicated by endophthalmitis—without atraia of infection from without, that we must look for final proof of the etiologic relationship of proliferative uveitis to sympathetic ophthalmia. Only a few such cases have been reported. Under this heading we find first a few cases of rupture of the sclera beneath intact conjunctivæ, and, secondly, sarcomata of the chorioidea which are reliably reported as having caused sympathetic inflammation of fellow eyes. The subconjunctival ruptures of the sclera, I would admit, may be excluded, because in no instance is it stated that fluorescin was used to outline an otherwise imperceptible defect in the conjunctiva, and because, secondly, the healthy intact conjunctiva is permeable for micro-organisms, the tubercle bacillus in particular (Cornet).¹

On the other hand I do not discredit the various reports of necrotic sareomata which are said to have caused sympathetic inflammation—as does Schirmer² (although the three cases by Fuchs have been contributed since Schirmer's work was written). One of Fuchs's sareoma cases, especially (Case 32, page 374), showed a most extensive proliferative uveitis and not one certain area of fibrinous exudate or plastic adhesion. The specimen of a second case of sympathetic inflammation following a cataract operation showed only very slight fibrin and cell exudate, and two other cases presented the greatest disparity between the amount of fibrino-plastic exudate and the extent of the proliferative changes in

¹ Cornet inoculated the conjunctival sac of animals, carefully avoiding any lesion of the epithelium; the conjunctiva remained unchanged, and the corresponding glands showed the *first* seat of infection. No infection whatever occurred in one animal. *Tuberkulose*, Berlin, 1906.

² "Sympathische Augenerkrankung." *Graefe-Saemisch Handbuch*, Auflage ii., Band vi., Abt. ii., Kap. viii., p. 54. 1900.

the uvea (p. 423). To these four cases of proliferative uveitis with minimal endophthalmitis should be added the three cases of infiltrative uveitis reported by Straub,¹ and referred to by Fuchs, as follows:

"The vitreous body remained completely free from infiltration in all three cases; moreover the retina, which is permeated by leucocytes in hyalitis, is normal; on the other hand the chorioidea is infiltrated. I must defer a complete report to a later date.² The eye was taken out because sympathetic ophthalmia developed in the other eye. I found a thick infiltration of all the layers of the chorioidea and of the ciliary body which extended through the perivascular space and along the nerves perforating the sclera. All three cases of genuine uveitis, uncomplicated by hyalitis, which I have studied, affected eyes which had been taken out because of sympathetic ophthalmia of the other eye."

Furthermore, in connection with this study of pure cases of proliferative uveitis, it should be noted that Fuchs has reviewed the ten cases in the literature in which an anatomic study of the sympathizing eye has been made; sections of four of these cases were studied by him in person, and his conclusions are that six of the ten had little or no fibrino-plastic exudation.

The evidence, therefore, that sympathetic inflammation is essentially caused by a purely infiltrative, or a proliferative, uveitis (of the primary eye, independent of any fibrino-plastic uveitis) rests, for the present, upon the reports of thirteen cases, and seems to be conclusive.³

¹"Ueber Hyalitis und genuine Uveitis," *Ber. d. ophth. Gesellschaft zu Heidelb.*, 1896, pp. 108-112. (*Vide* p. 111.)

²Straub does not note here the presence of epithelioid cells, although they may well have been present, and I cannot find a further report of these cases despite diligent search; so I have not put them with the twenty cases of proliferative uveitis causing sympathetic ophthalmia.

³Ruge's reply to Fuchs in the current issue of the *Arch. f. Ophth.* (Bd. lxv., Heft i., pp. 135-149), Dec. 11, 1906, largely concerns matters of classification and presents no new data, and, it seems to me, is en-

The further question arises, does proliferative inflammation *always* cause sympathetic inflammation? There are at least two cases which disprove this. One by Fuchs, page 446, is as follows:

"I have studied several eyes which were affected by a spontaneous chronic irido-cyclitis, some of which had precipitates in the anterior chamber and finally came to enucleation. The findings in these eyes are similar to those of sympathetic inflammation as well as to those of serous traumatic irido-cyclitis. The most prominent feature is an infiltration with mononuclear cells (in addition to which there were in one case indeed epithelioid and giant cells) while exudation upon the surface was insignificant or failed entirely."

Schoeble,¹ moreover, reports an eye, removed for fear of glioma three years after a perforation of the sclera by a briar, in which there was found an extensive proliferation of epithelioid cells within the uvea but which in no wise affected the fellow eye.

And again, on page 430, Fuchs says:

"It can indeed be that exceptionally such an inflammation may not go to the other eye, or that a spontaneously arising inflammation may give the same picture anatomically, although so far I have not seen this."

tirely beside the main issue which is whether or not epithelioid-cell proliferation within the uvea is the essential finding in the eye which causes sympathetic inflammation of a fellow eye. And, until some one makes a report of serial sections of a primary eye in an undoubted case of sympathetic inflammation showing *no* intra-uveal epithelioid-cell proliferation, one must accept the overwhelming evidence submitted by Professor Fuchs.

¹ "The chorioides is very much thickened, its vessels are enormously distended; a granulation-tissue mass, rich with many developing blood-vessels, breaks through the choroid and retina and develops an extensive tumor-like proliferation in the vitreous space. The new granulation tissue consists partly of epithelioid cells and partly of cells which can be morphologically distinguished in no way from true epithelial cells."—"Ueber hyperplastische Entzuendung der Augenhauts," *Arch. f. Augenheilk.*, Bd. xx., pp. 98-322. (*Vide* p. 104.) 1889.

That, too, proliferative uveitis may be present in the primary eye before the outbreak of genuine inflammation the case described on page 432 shows. Here sympathetic irritation was present and was relieved at once by the enucleation of the exciting eye. The latter showed an unmistakable proliferative uveitis.

Lastly, are there cases of genuine sympathetic inflammation in which there is *no* proliferative inflammation in the primary eye? Yes, although Fuchs found only one such among thirty-five cases. On page 436 he says:

"In the following case the clinical diagnosis of a sympathetic inflammation appears to be unquestionable. The needle from a sewing-machine had sprung loose and struck the eye of a twenty-year-old patient, causing a perforating corneal wound. The prolapsed iris was removed in the clinic and a traumatic cataract extracted a month later, after the eye had entirely quieted down. The eye healed well and the patient was discharged with vision of fingers at 1½ metres. After 2½ years he returned because the vision of the left eye had begun to decrease. The right eye was a little injected (there was also a trachoma) and was somewhat enlarged, for increased tension had set in and had led to ectasia of the anterior part of the sclera. An iritis with many precipitates and ciliary injection was present in the left eye; vision, $\frac{1}{18}$. This condition remained unchanged after enucleation up to the time of the discharge of the patient. The anatomic study of the enucleated eye showed that the iris was everywhere firmly adherent to the cornea; the sclera was thin, the optic nerve head deeply excavated. Aside from these marks of long-continued increase of tension the inner coats of the eye showed neither evidences of plastic exudation nor yet of sympathetic inflammation, but were simply atrophic."

No satisfactory explanation can be offered for this case; it constitutes *the* weak point in an otherwise strong chain of evidence. Fuchs does not state, however, that serial sections were made of this particular eye, and it is

possible that epithelioid-cell proliferation was present in parts of the uvea not studied.

VII. CONSIDERATIONS LIMITING THE STATEMENT THAT
UVEITIS PROLIFERATIVA IS PATHOGNOMONIC OF
OPHTHALMIA SYMPATHICA.

I have thought it best to summarize here the cases noted by Fuchs and others that should limit unwarranted generalizations and deductions. In other words, *proliferative uveitis is in no wise pathognomonic of sympathetic ophthalmia*, because:

1. Typical sympathetic inflammation occurred in one case without any proliferative uveitis in the exciting eye. (Fuchs, page 436.)
2. Typical proliferative uveitis was present in one case presenting only symptoms of sympathetic irritation of the fellow eye. (Fuchs, page 432.)
3. Typical infiltrative uveitis with epithelioid-cell proliferation occurred in one case of spontaneous iridocyclitis. (Fuchs, page 446.)
4. Typical infiltrative uveitis, though without epithelioid cell proliferation, occurred in three cases of "serous" iridocyclitis. (Fuchs, pp. 439-444.)
5. Only one case of proliferative uveitis absolutely uncomplicated by fibrino-plastic uveitis has been reported (Fuchs, Case 32, page 374), and the sympathizing eye of this case showed "some synechiae"; unfortunately this case is further open to the criticism of those who doubt that sarcoma of the chorioidea may cause sympathetic inflammation of the other eye in the absence of an atrium of infection from without.
6. Epithelioid-cell proliferation has been specifically noted in but one of the ten sympathizing eyes studied (Schirmer, 1900, p. 188), although Professor Fuchs has said six of them show little or no endophthalmitis (page 425).

7. Epithelioid-cell proliferation is not found in the late stages of sympathetic inflammation (Schirmer, 1900, page 107, and Fuchs, page 412); it is seen very early only by the use of oil immersion (writer's Case III).

VIII. CONCLUSIONS.

I. The three cases of sympathetic inflammation which the writer has studied corroborate the findings of Fuchs, based upon thirty-five cases, that "*proliferative uveitis*" is the essential anatomic condition present in the eye which causes sympathetic inflammation of its fellow.

II. A fibrino-plastic uveitis usually complicates the proliferative uveitis of sympathetic inflammation.

EXPLANATION OF TEXT-PLATE.

FIG. 1.—Corpus Ciliare of Case I., Showing Uveitis Proliferativa and Infiltrativa Complicated with Some Uveitis Plastica.

From without inward the findings are as follows:

1. Tumefied episclera.
2. Normal sclera.
3. The compressed *musculus ciliaris*.
4. A heavy-staining zone of infiltrating round cells.
5. The clear-staining areas of proliferated epithelioid cells.
6. Pigmented retinal epithelium broken through in places by granulation-tissue masses.
7. Unpigmented layer of retinal epithelium which is still intact though detached from the pigmented layer by the granulation tissue.
8. Inconsiderable cell exudate between the corpus ciliare and the external limiting membrane of the vitreous.

FIG. 2.—Epithelioid Cells Derived from a Vessel.

1. Adventitial endothelium.
2. Intimal endothelium.
3. Blood-cells.
4. Round cells.
5. New epithelioid cells.

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NEURITIS OF THE INTRACRANIAL PORTION OF THE OPTIC NERVE.

BY DR. H. GRADLE, CHICAGO.

In his exhaustive study of the lesions of ocular nerves in syphilis of the brain, Uhthoff¹ found that the optic nerve may be inflamed peripheral to the chiasm without extension of the lesion down to the eyeball. In most of the instances the nerves were involved secondary to surrounding syphilitic lesions. There was hence both perineuritis and neuritis. But at least in one instance there was a neuritis of the interior of the nerve alone. The inflammatory evidences descended in some cases to a variable extent into the orbital portion, in others terminated within the optic canal. Close to the eyeball the nerve was normal in some specimens, in others in a variable state of atrophy. In Uhthoff's own observations (17 cases), as well as in 150 autopsies of cerebral syphilis reported by others and reviewed by him, the lesions of the optic nerves were but a part of the lesions found at the base of the brain. While in most instances both nerves were involved, there were, too, cases of disease of only one optic nerve. An isolated affection of one optic nerve without other cerebral lesions is however not likely to lead to death and to autopsy.

In the clinical part of his paper Uhthoff² describes the symptomatic characteristics of syphilis of the optic

¹ *Von Graefe's Archiv f. Ophth.*, Bd. xxxix., 1, 1.

² *A. f. O.*, Bd. xxxix., 3, 126, and especially pp. 194-203.

nerves, referring to the variability in the course and the infrequency of central scotoma. But he does not sketch the clinical picture peculiar to isolated inflammation of the intracranial part of the nerve. As far I am aware this has not been done by any other author.

In an article "On the Diagnostic Significance of One-Sided Amblyopia without Ophthalmoscopic Lesions,"¹ I reported a few cases of transient amblyopia which seemed to me best explained by the assumption of an optic neuritis limited to the intracranial portion of the nerve. I have now had under observation a similar instance which on account of its sequel seems to me even more conclusive as to the seat of the lesion.

CASE 1.—Mr. F. H., fifty-three years of age, apparently in good health, had a sunstroke fifteen years ago, and was again prostrated by heat two weeks ago, followed by much headache for a week. Since that time—two weeks—he can scarcely see with the left eye.

Both pupils small and sluggish in reaction. Fundus normal in every way in both eyes (also on dilating pupils). Movements of eyes normal. R. E. V. — $\frac{3}{8}$ —with cyl. +0.5 axis 20, V = $\frac{3}{8}$. L. E. fingers seen at one foot.

V. F. normal in R. E. and apparently so in L. E. and no scotoma demonstrable. Color sense perfect in R. E., but no colors recognized in L. E. The knee-jerks enfeebled on both sides. Tongue coated, bowels said to be normal. He was given a few purgative doses of calomel, and 3.00 iodid three times per day.

About the fourth day he began to notice improvement, and on the tenth he could see colors with L. E. and could count fingers at two feet. Mercuric bichloride was now given in addition to the iodid. The improvement continued steadily, and in two months the left vision reached $\frac{3}{8}$. The ophthalmoscope showed now unmistakable beginning atrophy of the papilla of the L. E., while in the R. E. the retinal veins seemed a little fuller than normal. One month later (the

¹ *Ophthalmic Record*, April, 1899.

end of the third month) the atrophy of the left optic nerve was fairly distinct and the nerve-head grayish. The retinal veins of the R. E. were still larger than normal. The left vision had not improved measurably beyond $\frac{1}{2}$, but objects and colors seemed more natural to him. At no time could a scotoma be demonstrated even for colors. The pupils are still sluggish in both eyes, approaching the Argyll-Robertson type. The knee-jerks have remained enfeebled. There is no ataxia and no interference with his general health.

At the time of his first examination the blindness in the L. E. could not be accounted for by any intraocular change. There was nothing to warrant the diagnosis hysteria. It could hence only be an affection of the left optic nerve somewhere between the chiasm and the eyeball. In retrobulbar neuritis there is always more involvement of the fibres supplying the macula than of the rest of the nerve fibres, and our diagnosis is based on the demonstration of the central scotoma. As Greef¹ has shown, even cases of apparently complete blindness show a narrow zone of perception at the extreme periphery of the field in retrobulbar neuritis of unusual severity. This was hence not a case of neuritis localized in the nerve close to the eyeball. The subsequent atrophy proves that either there was temporary pressure upon the nerve, of which there never was the least evidence, or neuritis of the intracranial portion peripheral to the chiasm.

The patient denied syphilis and presented no evidence of it. It was suspicious, however, that in a long married life with a healthy wife he had had but two children who died long ago in early infancy, and had had none since. Moreover there were two other symptoms present suggestive of syphilis directly or at least of incipient tabes, viz., the narrow pupils nearly irresponsive to light, and the distinct enfeeblement of the knee-jerks. The steady

¹ *Berl. klin. Wochenschrift*, No. 40, 1898.

improvement following the use of iodid I would not consider indicative of a syphilitic origin, since the ordinary retrobulbar neuritis, certainly not specific, follows about the same favorable course even without the use of iodid.

In order to establish the clinical picture of intracranial optic neuritis, I will quote in brief the cases formerly reported by me.

CASE 2.—Mr. C. H., forty-five years old, had a doubtful sore in his seventeenth year for which he was treated for some months. He has never had any other evidences of syphilis and has healthy children. He has always been nervous and has had more or less dull headache at times and spells of dizziness perhaps due to sluggish bowels. Two years ago he had a transient attack of incomplete aphasia for twenty-four hours, and a similar accident a few months ago. Since one year his virile power has diminished.

Since eleven years he had called on me from time to time for more or less asthenopic discomfort not relieved entirely by glasses (cyl. + 0.5 ax. o). With perfect vision he has always had subnormal accommodation. In the morning of July 13, 1898, he found the sight of the R. E. dimmed without other symptoms.

The left eye is normal, V = $\frac{2}{3}$ (corrected); PP. = 12 inches. The right eye is absolutely normal externally and internally, not tender, and the pupillary reaction perfect; vision reduced to $\frac{2}{10}$; no scotoma; field for white normal; for red normal; for blue somewhat restricted and about the same as for red, while for green it is very much restricted, that color being scarcely recognized. No anaesthesia or other hysterical stigmata could be found; knee-jerks normal. He was given a dose of calomel.

Two days later condition unchanged. He was now put on large doses of salicylate of sodium. On the sixth day the right pupil was unmistakably a trifle more sluggish than the left in reaction and wider than the left when the other eye was closed; vision perhaps a little better.

He continued taking salicylate not quite regularly until on the twelfth day his vision had risen to $\frac{4}{5}$. There was still

a slight difference between the pupils, both, however, being less sensitive to light than normal.

For another week he took the same drug irregularly, but in spite of it his sight failed again and had now fallen to $\frac{1}{100}$. Still no scotoma; field normal; colors scarcely perceived; pupil as before. Repeatedly he had been examined with dilated pupil and the fundus found normal. A blister put on the right temple had no effect upon the sight. On August 1st (the eighteenth day) the sight of the right eye was barely $\frac{1}{100}$. The field was now reduced concentrically. The pupil was nearly immobile and slightly dilated. He was sent to Dr. Patrick for examination, who found no evidence of any other nervous disease. He was now placed upon increasing doses of iodid.

Eleven days later vision had risen to $\frac{1}{100}$; F had become nearly normal; colors were dimly perceived centrally, and the right pupil showed slight reaction, the left being also still noticeably sluggish. Two weeks later, on the 25th of August, the right eye had regained $\frac{1}{8}$ and was perfect objectively and functional in every way and has remained so since.

CASE 3.—Mrs. B., widow, thirty-six years old, has a neurotic family history. Her sister had typical tabes. She is in fair health and has neither a specific history nor presents any indications of syphilis. Eight years ago she had a spell of transient blindness of the right eye lasting a few weeks. Her menses, expected about the first of the month, were delayed without known cause until the 12th, since which time (two weeks ago) she has had a diffuse headache with pain in the eyes, especially the left. Headache and pain are now diminishing. The sight, formerly natural, has become dim in the left eye. She claims to see double on threading a needle.

The eyes are normal externally. There is some doubtful tenderness of the left eye to pressure. Pupils absolutely normal and both alike. Fundus normal in both eyes. In the left eye the arteries and veins of the retina are more tortuous than in the right.

R. E. V = $\frac{1}{8}$; field normal; color zones nearly if not quite of normal extent. Accommodation difficult at seven inches.

L. E. V = $\frac{1}{100}$; field normal; colors not recognized; no scotoma.

There was no disturbance of any of the muscles and no diplopia under any tests for binocular vision.

While the patient presented no symptoms of any nervous disease except the visual disturbance, her knee-jerks were totally absent even on re-enforcement. Even in the absence of all ataxia or vertigo or sensory disturbances the Westphal symptom in connection with the history of tabes of her sister suggested the possibility of tabes. She was placed upon iodid in increasing doses, taking finally 2.0 three times a day.

Two days later V was the same, but colors became dimly recognizable. The headache had ceased. On the fourth day V of the left eye was $\frac{1}{2}$. On the eighth day V had reached not quite $\frac{1}{2}$, but reading with the left eye was still very difficult, even with convex glasses. There were no new objective appearances. At the end of two weeks the R. E. had V $\frac{1}{2}$; the L. E. $\frac{1}{2}$. The accommodation was normal and the patient seemed well. Four months later she was still entirely well.

Two years later she returned on account of numbness of the left side of the tongue and of absence of taste on the left side. There was diminished sensitiveness to touch and to the prick of a pin on the left cheek and left side of the lip and tongue. The knee-jerks were absent. Although she did not complain of her sight it was found only $\frac{1}{2}$ in the R. E. and $\frac{1}{100}$ in the L. E. With the L. E. colors were seen quite dim, but the V. F. was normal. The ophthalmoscope showed an unquestionable, though very slight atrophy of the left optic nerve, while the right papilla was suspiciously pale. Under iodid the sight of the L. E. rose in one week to $\frac{1}{2}$, while the right eye did not change. Unfortunately she was not seen again.¹

The rapid improvement when first seen makes it more than doubtful whether the treatment with iodid was

¹ Mrs. B. was seen again after an interval of six years. She has been in fair health. No evidence of tabes. The knee-jerks, formerly not demonstrable, can now be barely demonstrated. The R. E. has still V. $\frac{1}{2}$ —, with normal fundus though slight pallor of disk. The L. E. counts fingers at 4 feet. Normal field, colors still recognized though dimly. No scotoma. There is distinct moderate optic atrophy. An ordinary retrobulbar neuritis would not have been followed by a progressive atrophy. Some of the former nervous symptoms were hysterical.

responsible for the result. Indeed the headache had begun to decline before she was under treatment. While the patient's emotional condition suggested hysteria no stigmata were found, and the integrity of the visual field, which was tested repeatedly with white and colors, as well as her right-sided headache, speak rather against hysteria. If the lesion was, as I supposed, an intracranial neuritis of the left nerve, the right optic nerve was also slightly involved. For the vision of the right eye was only $\frac{1}{2}$ when she first called, but it became normal during the treatment. The examination two years later showed further organic changes in the optic nerves, positive atrophy in the left, and a suspicion of it in the right. The general condition of the patient at this time made the diagnosis of incipient tabes very probable.

On reviewing these three cases the transient failure of sight can best be explained by the assumption of a diffuse neuritis involving only the intracranial portion of the optic nerve. The clinical characteristics of this assumed lesion are consistent with our knowledge of the topography of the fibres in the intracranial trunk. *Sudden diminution of sight, without central scotoma and with nearly normal field, but with decided impairment or abolition of color perception throughout the field, tendency towards recovery, but possibly ending in incomplete atrophy, with absence of all other symptoms except initial headache,* is hence the clinical picture of intracranial optic neuritis. The pupillary reaction is impaired only in proportion to the diminished light perception. The most probable cause of the lesion is syphilis.

While uncomplicated intracranial neuritis is apparently rare, I have reason to believe that a mild degree of inflammation of the optic nerves within the skull is not an infrequent complication of basal syphilitic lesions involving some of the motor nerves of the eyes. I have seen at least six instances in which various ocular palsies,

due to syphilis, were accompanied by dimness of sight in one or both eyes without fundus changes. The impairment did not reach a high degree, there was neither scotoma nor constriction of the field, while color perception was slightly dimmed. The patients were scarcely conscious of their impaired sight perhaps on account of the greater annoyance caused by the diplopia. Full recovery occurred in all under specific treatment. The following instance may serve as an illustration of this form of optic neuritis.

CASE 4.—Mr. L., thirty-five years old was fitted with glasses for asthenopia and these were the findings:

R. E. with -1.5 cyl. -1.5 axis 160 V = $\frac{1}{2}$ + . L. E. with -1.5 cyl. -1.5 axis 40 V = $\frac{1}{2}$ + .

One year later he returned with a paresis of the right external rectus and trifling enlargement of the left pupil due to a syphilitic infection of six years' standing. He did not complain of impaired sight, but with his correction his R. E. had only $\frac{1}{2}$ uncertain, while his L.E. was very uncertain as to $\frac{1}{2}$ and did not read $\frac{1}{2}$ with accuracy. The fields were normal, but colors appeared a trifle dim especially with the R. E. The ophthalmoscope showed no lesion. Under energetic treatment with mercury and iodid his sight reached its former standard of $\frac{1}{2}$ + in about ten days while it took some five weeks before the paresis had completely disappeared.

I have records of five other instances of ocular pareses with slight visual dimness unexplained by the ophthalmoscopic findings. They differed from the case above reported only in the degree of impairment—which was always slight—in the muscles involved, and in the duration. There is hence no object in detailed repetition. In three of them only one optic nerve was involved, in the other three (including Case 4) both eyes were slightly impaired but to an unequal extent.

A CASE OF BILATERAL, PAINLESS DILATATION OF THE FRONTAL SINUSES DUE TO DEATH OF THE LINING MUCOUS MEMBRANE.

BY DR. JOHN DUNN, RICHMOND, VA.

(*With two illustrations on Text-Plate VI.*)

THE following case, unique in my experience, and one the counterpart of which I am unable in the works at my command to find described, is interesting, not only as a curiosity, but because it suggests certain questions as to the relation between the mucous membrane of the frontal sinuses and the nutrition of the underlying bony walls.

Mr. A., aged twenty-three, gave in the spring of 1906 the following history. In 1902 he suffered for several days with a severe pain behind his right eye. His physician told him it could not be reached by an operation and that he would receive no relief until "it burst." Accordingly he had been kept under morphine for several days, when a sudden profuse discharge from the right side of his nose brought permanent relief. The discharge ceased in a few days and there has been no return of it. During the next year he began to notice that his "forehead was swelling," and this swelling has gradually increased until the present condition has been brought about. There has been no accompanying pain; no abnormal sensation whatever, save an occasional feeling of fulness. Such was the account given by Mr. X. I saw his physician, whose memory of the details of the case was most imperfect. He was under the impression there had been a double frontal sinusitis. The patient is positive that the pain had been only behind the right eye and that relief had followed a sudden

ILLUSTRATING DR. DUNN'S ARTICLE ON "FRONTAL SINUS DILATATION."



FIG. 1.—Frontal Sinus.



FIG. 2.
Radiograph of head shown in Fig. 1.

discharge from the right side of the nose. Mr. X. consulted me to see if anything could be done to prevent further "bulging of his forehead." Fig. 1 shows the appearance presented in the spring of 1906. There was a very marked protrusion of the region overlying the frontal sinuses. The swollen region showed no outward evidences of inflammation; it was bony hard on palpation and was not in the slightest degree painful, either objectively or subjectively. The intranasal structures were in every way normal in appearance and in function. There was no hypertrophy of any of the turbinated structures; no abnormal secretion from the mucous membranes, either of the nose or accessory cavities; no pain in eyes; no disturbance of vision. Only a slow, constant symptomless increase in the size of the region over both frontal sinuses. As for diagnosis, the best I could do was to suggest the possibility of bilateral cyst of the frontal sinuses. This diagnosis, however, was entirely unsatisfactory to me. An X-ray picture (Fig. 2), showed the trouble, whatever its nature, to be confined to the frontal sinuses, and also showed their great increase in size and a thinness of the external bony wall. Mr. X. was put under chloroform and an exploratory incision made over the most prominent part of the protrusion. The external bony plate of both sinuses was found to be of a thickness little greater than that of one's thumb nail. Immediately beneath the bone lay a grayish white membrane which on pressure burst as might a thin dried bladder filled with air. The walls of the frontal sinus were dry, of a dead-white color, and as hard as ivory. The bone was apparently either bare or covered with a very thin, grayish white membrane which as it was scraped away did not bleed, save that in a few spots a minute amount of dark blood seemed to find its way through the bone. Both sinuses were alike in these respects. Both naso-frontal ducts were open.

It was clear that we had to do with a *complete bilateral atrophy of the mucous membrane of the frontal sinuses*. The thinning and subsequent dilatation of the sinus walls had been secondary to the death of its inner

periosteum, *i. e.*, of the mucous membrane, plus the increased pressure exerted by the intrasinusal air whenever the patient blew his nose. The external wound healed without trouble. Some months have now passed since the operation, and the patient thinks the bulging of his forehead is still increasing. He is conscious now of "a pressure within his forehead" each time he blows his nose. The outer bony wall is still hard to the touch. When, in the treatment of purulent conditions, the entire mucous membrane of the frontal sinus is scraped away the sinus eventually becomes obliterated by the springing up of granulations from the bare walls into which bone cells find their way later on. This is made possible by the rich vascular anastomosis between the blood-vessels from the mucous membrane serving as the internal periosteum and the vessels from the external periosteum and the dura mater. In the case of Mr. X. death of all the vessels, large and small, running through the mucous membrane of both frontal sinuses took place; the process, whatever it was, affected not only all the vessels in the mucous membrane, but, it would seem, also all the anastomotic vessels which sprang originally from the vessels of the mucous membrane. Why this should render the presumably dead inner bony plate so elastic as to allow of dilatation of the sinuses and a thinning of their walls under such pressure as is produced by the air within the sinus is a difficult question to answer. This strife between the outer healthy table furnished with a rich blood supply and its yokefellow the dead inner plate whose blood supply has been taken away is an interesting one on which to speculate. In one case under my care of brain tumor of two or more years' duration the parietal bone was found to be abnormally thin, the outer and inner tables being practically one. There was, however, no bulging of the cranial wall. In the case of Mr. X. there is, so far as I have been able to make out, no bulg-

ing of the sinus walls toward either the cranial cavity or downwards toward the orbits. Whether such bulging is destined to take place to such an extent as to be demonstrable time will decide. I have been unable to suggest any treatment. In searching for the cause of the death of the lining mucous membrane, syphilis is the first thing which suggests itself. The patient claims never to have had this disease. I can see only a faint, possible relationship between this case and those rather rare cases of spontaneous gangrene of the fingers and toes. In the latter all the vessels to the affected parts are diseased, while here only the vessels supplying the inner table of the bone are involved.

A CONTRIBUTION TO THE SUBJECT OF THE
CAUSATION OF GLAUCOMA BY
INTRAOCULAR TUMORS.

BY DR. BROWN PUSEY, CHICAGO.

(*With three drawings on Text-Plate VII.*)

(From the Pathological Laboratory of the University of Chicago.)

THE ætiology of glaucoma secondary to intraocular tumors is a subject that is very obscure. Recently, through the courtesy of Dr. T. A. Woodruff, I have studied a very rare case which shows one of the ways—and there may be several, just as there are probably several ways by which so-called primary glaucoma is caused—by which such a growth may cause intraocular tension.

Mrs. H. S., age sixty. About thirty years ago the left eye was injured by being struck with a piece of kindling wood. This was followed by pain in the eye, photophobia, etc,—probably a traumatic irido-choroiditis. The eye recovered with as good vision as the other. Two years ago she noticed flashes of light in the left eye (the eye that was injured), and the eye became painful and inflamed, and the sight began to fail. This condition gradually became worse, and during the last six months she has had constant dull pain, with "spells of severe pain." At present the eye is tender, T + 1, V $\frac{1}{15}$; pupil reacts very sluggishly to light, and is semi-dilated. The cornea is hazy. On Descemet's membrane toward the lower margin and in the pupillary area there are several discrete pigmented spots. At the root of the iris, in the inner

ILLUSTRATING DR. BROWN PUSEY'S ARTICLE ON GLAUCOMA



FIG. 1.



FIG. 2.



FIG. 3

upper quadrant, there is a dark brown deposit of a pyramidal shape. The diagnosis of tumor was made and enucleation was advised and accepted.

The enucleated globe, which was of normal dimensions and which had with it a piece of optic nerve a quarter of an inch long, was put in 10 per cent. formalin where it remained for two days. It was then frozen and bisected in the horizontal meridian. The conditions shown on bisecting the globe are indicated by drawing No. 1.

On the inner anterior surface of the sclera and involving a small area of the cornea there is a densely pigmented tumor. The tumor in its most posterior portion extends to about the region of the equator and at its thickest part is about 6mm thick. Anteriorly it involves the anterior chamber, where it has a pyramidal shape with the base, as seen through the cornea, involving 4mm or 5mm of the corneal circumference and the apex reaching 3mm or 4mm from the limbus region. The anterior chamber is of normal depth and the angle is everywhere fully open except in the very small area occupied by the tumor. The angle of the anterior chamber—seen from within—is marked by a line of dense pigment. The iris appears normal, although after cutting away a portion of the cornea and allowing an unobstructed view, some very suspicious dark areas are seen. The lens is not dislocated, but shows an interesting deformity in a rounding of its inner edge, which has been caused by pressure by the tumor. The retina is not detached from the choroid; in the region of the tumor the choroid is pushed forward. The optic nerve is abnormally small in cross diameter; the nerve head is cupped.

For microscopical examination the eye was imbedded in celloidin and sectioned. Sections were stained with various stains. Microscopically the limbus region and the region of the root of the iris in all sections offer a most interesting picture of an invasion with pigmented cells. (Figs. 2 and 3.) The meshwork of the pectinate ligament is a mass of pigmented cells, and from here pigmented cells have wandered into the posterior layers of the cornea, the posterior layers of the sclera, and particularly along the lymph spaces around the

blood-vessels. The blood-vessels of this region are engorged with blood and can be followed unusually well in their course. The vessel walls, including the sinus venosus scleræ, are normal. The sinus venosus scleræ is patent and the vessels of the sinus are everywhere invaded by pigmented cells. Within the lumen of the vessels of the sinus venosus scleræ, as a rule, one does not find pigmented cells, but in some sections they can be seen within the blood-vessel wall. The vessels leading from the sinus to the ciliary body and the perforating vessels leading to the episcleral vessels are full of blood, and the perivascular lymph spaces of these vessels are infiltrated with pigmented cells. The invasion of the limbus region along the perivascular lymph spaces, as a rule, does not extend more than about one-half the way through the scleræ; in the region of the seat of the tumor, however, pigmented cells can be traced to the episcleral tissue where they are found around the blood-vessels. The cornea is normal except for the slight infiltration of pigmented cells in its posterior layers; along Descemet's membrane in the anterior chamber pigmented tumor cells also occur. In none of the sections is there cutting off of the angle of the anterior chamber by adhesion of the iris to the cornea, nor is there evidence that such an adhesion has existed and disappeared.

The iris tissue as a whole appears fairly normal. The interesting finding in connection with the iris is its invasion with pigmented tumor cells and the principal seat of this invasion is its root. As is shown in figures Nos. 2 and 3, the root of the iris is a mass of such cells. Along the entire anterior surface of the iris these cells have attached themselves and at some places have formed nodules; at other places they have invaded the deeper tissue of the iris. Invasion of the deeper tissue by the tumor cells is particularly noticeable toward the pupillary border. From the pigment-cell invasion at the junction of the iris with the ciliary body one can see very well marked a further invasion of the ciliary body by the tumor cells.

As is shown in figures Nos. 2 and 3, these cells form a tongue-like mass in the vascular area between the muscle and the processes. With the exception of this invasion of cells the ciliary body is histologically normal.

In the region spoken of in the macroscopical description as the part of the tumor invading the anterior chamber, the sections show a much disturbed tissue. The tumor in its growth forward along the suprachoroidal space, has pushed choroid, retina, and ciliary body inward and has invaded the anterior chamber. In this region the histological structure of the tumor is the same as that shown by other parts—possibly here the tumor tissue is more highly pigmented. This portion of the tumor mass projects into the anterior chamber and on the surface the cells lie loosely together, forming a very irregular border, with no membrane separating them from the aqueous humor. The lens on the side toward the tumor is cataractous. Adherent to the lens capsule in various places—in front and behind—there are pigmented cells.

The retina anteriorly is atrophic; posteriorly it appears fairly normal. The optic nerve shows an increase of connective tissue, the vessels of the nerve are full of blood; their walls are normal. There are no pigmented cells in the lymph spaces around these vessels. The nerve head is moderately cupped.

The choroid away from the region of the tumor is normal. In the region of the tumor the choroid is displaced inward; the inner layers, including the pigmented layer of the retina, which is everywhere attached to the choroid, can be traced over the tumor forward to the ciliary body. In the region where the choroid overlies the tumor, the inner layers of the choroid are not much involved in the tumor growth except in places far forward near the ciliary body; here the tumor has broken through the choroid.

In the examination of the sclera two of the venæ vorticosæ were examined. They are full of blood. A few pigmented cells are found around the vessel walls in the beginning of their course.

The tumor growth histologically is made up of small spindle and round cells, with a structure similar to that usually found in such tumors having their origin in the choroid. In some regions it is highly pigmented, while in others there is no pigment. The growth has few blood-vessels. A few cells are found which show karyokinetic figures. On the sclerotic side,

the tumor is firmly applied to the sclera, and forward one finds invasion of the sclera by the tumor cells along the perivascular spaces.

These findings may be briefly summed up as follows: The angle of the anterior chamber is open except in one small region where it is invaded by the tumor. There is an invasion of the limbus region by pigmented tumor cells completely filling the meshwork of the pectinate ligament, involving the sinus venosus scleræ, and extending along the perivascular lymph spaces deeply into the scleral tissue, in one region perforating it and appearing in the episcleral tissue. There is a marked invasion of the tissue at the junction of the iris and the ciliary body, and a deeper invasion of the loose tissue of the ciliary body, between the muscle and processes. The iris proper is only slightly invaded. There are pigmented cells within the lumen of the vessels of Schlemm's canal. Pigmented cells are found on the posterior surface of the lens. The perivascular lymph spaces of the vessels of the optic nerve are free of such cells. The head of the optic nerve is slightly cupped. The *venæ vorticoseæ* are normal.

Clinically and pathologically we have here a case of glaucoma secondary to an intraocular sarcoma, and, as was said, a rare case in which the explanation of the cause of the increased tension is plain.

Fortunately the explanation is not far to seek and it can be based on well demonstrated facts. Reviewing the physiology of secretion and excretion of the eye, and doing it briefly without referring to the literature (For complete consideration of this subject see Leber's article, "Die Circulations und Ernährungsverhältnisse des Auges," in the *Graefe-Saemisch Handbuch der Gesamten Augenheilkunde*, zweite Auflage), it may be said that we can consider as established that the aqueous is secreted in most part by the ciliary processes, that it gets into the anterior chamber by passing through the pupil, and from the anterior chamber it passes through the spaces of Fontana and comes in contact with the

veins of the circulus venosus sclerae and is slowly and continuously absorbed. An equally well established fact is that the intraocular tension becomes increased when the channels of exit from the anterior chamber are interfered with.

For the experimental findings directly applicable to the case before us we are indebted to Niesnamoff.¹ Based on the facts briefly alluded to in the foregoing paragraph he made experiments on the quantitative relations of filtration and secretion of the aqueous humor. He demonstrated that a pure physiological sodium-chloride solution filters constantly at an unchanged rate through the angle of the anterior chamber of a dead eye, and that when a not quite pure fluid was used or one in which insoluble particles were suspended (pigment from the ciliary processes and the posterior surface of the iris was used among other things), the rate of filtration gradually decreased and finally came to a complete standstill. His conclusion was that the interference with filtration was due to a stopping up of the network of the pectinate ligament by the insoluble particles.

We can apply these facts directly to our case. In this case pigmented cells which had their origin in the tumor got into the anterior chamber, thence into the spaces of Fontana, where they acted as occluding particles, interfered with the exit of fluid from the eye, and thereby caused glaucoma.

I have looked through the literature and in a fairly careful search have found recorded two cases like mine. These cases were studied by Polya.²

Cases similar to these but in which the occluding particles were of different origin are recorded by a few observers. Panas and Duvigneaud³ studied a case of secondary glaucoma caused by occlusion of the sclera-corneal network by pigmented cells resulting from an inflammatory process. Hippel⁴ has reported a case like

that of Panas and Duvigneaud. Schirmer⁵ in his work on sympathetic ophthalmia speaks of a section from a glaucomatous eye, which he had gotten from Mr. Treacher Collins, in which the angle of the anterior chamber was free and in which the network of the pectinate ligament was stopped up with round cells.

Another class of cases of glaucoma is recorded in which the spaces of Fontana are filled with pigmented cells (cells from tumors and inflammatory processes) and other débris, and in which the common anatomical finding in this region exists, *i. e.*, adhesion between the cornea and iris at the angle of the anterior chamber. These cases with little question represent advanced stages of the process spoken of above, and herein the cases like mine become more important, for they explain the cause of increased tension in this latter and large class of cases.

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ILLUSTRATING DR. RADCLIFFE AND DR. GOLDBERG'S ARTICLE ON "GLIOMA RETINÆ."

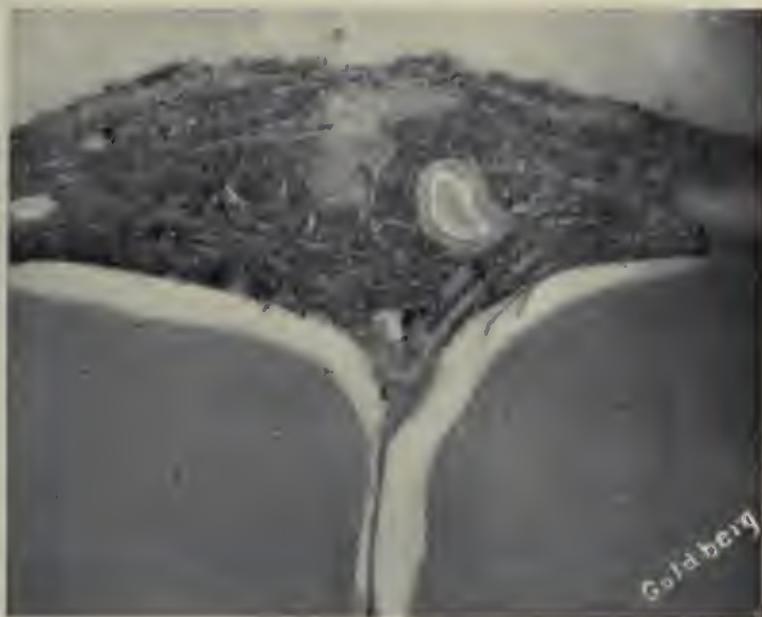


FIG. 1.

Section of spinal cord showing invasion of sheath by glioma cells.

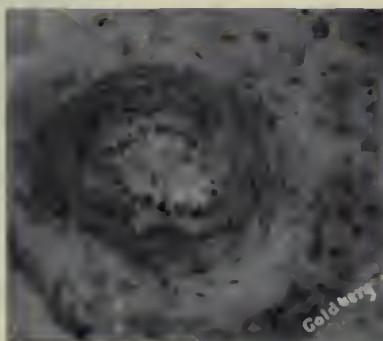


FIG. 2.

Section through blood-vessel showing arrangement of neuroglia cells in lumen of vessel.



FIG. 3.

Photograph of liver, showing metastatic invasion by glioma cells.

GLIOMA RETINÆ—COMPLETE REPORT OF
AN EXTENSIVE CASE.

CLINICAL HISTORY BY McCLUNEY RADCLIFFE, M.D.

SURGEON TO WILLS HOSPITAL.

HISTOLOGIC STUDY BY HAROLD G. GOLDBERG, M.D.,
PATHOLOGIST AND CURATOR WILLS HOSPITAL.

(*With three illustrations on Text-Plate VIII.*)

THE patient, a female child of two years, was admitted to the Wills Hospital May 19, 1902. The mother gave the following history. When eight months old the child fell and struck her face against the floor. The mother used the ordinary home remedies, with the result that a lump which had appeared on the forehead passed away in a few days. When a year and a half old she had another fall, this time striking her temple against an iron knob. The child fainted and was revived by cold water. About one month after this accident the mother noticed in the left eye a peculiar amber tint (as she described it) which could only be seen by gas-light when the child moved her head in certain positions. At this time the child had whooping cough quite severely. The third week in April she had measles, to which the mother attributes the activity of the growth. The mother claims that immediately following this attack of measles the amber reflex became rapidly more apparent, until finally she could see it in daylight. She watched the eye carefully, noting that the amber spot had now become white,

could be seen at any time distinctly, and appeared to be growing forward, filling the globe.

An examination at this time showed: cornea clear, pupil $3\frac{1}{2}$ millimetres round; responded equally and freely to light; tension normal. The ophthalmoscope showed a whitish somewhat prominent spot in the fundus in the region of the optic nerve, to the temporal side; small minute vessels were on the surface of this prominence. Glioma was suggested and enucleation advised. This being refused by the mother she was told to report again in two weeks. September 1st, the child fell and struck the affected eye, which became inflamed; the day following the accident, the fellow eye also became inflamed; the mother claims that the lids were so swollen that both eyes were closed and it was with difficulty that the child could open them. There was a discharge from both eyes resembling flakes of starch. The mother thought that the good eye was becoming affected and reported at the hospital September 8th. An examination made at this time showed: cornea clear, pupil fully dilated and immobile, anterior chamber shallow, tension slightly plus. One half of the globe was filled with a yellowish white mass; there were no inflammatory signs. The patient was seen in consultation, and enucleation again advised and again refused. According to the mother's statement, on the evening of December 7th she noticed a patch of blood upon the white part of the affected eye; she thought this was due to an abscess which had broken and which was discharging, she immediately reported at the hospital. During all this time the child complained of no pain, except when asked she would put up her hand to the affected side. The mother also noticed that she preferred to lie upon this side in bed.

December 8th, an examination showed quite a marked exophthalmus, a subconjunctival hemorrhage covering the inner half of the left eyeball, pupil fully dilated and

immobile, anterior chamber shallow, tension + 2, iris slightly discolored, aqueous turbid, globe slightly larger than normal, a yellowish mass seen through the pupil filling the globe, mobility limited in all directions, general health poor.

December 10th, the left eye was enucleated; the orbit was found to be involved and was completely eviscerated. A large portion of the swollen nerve was removed, with the mass of tissue as far back as the foramen, including the periosteum of the orbit. The orbit was packed with boroglyceride and bichloride gauze and a bandage applied. The patient was returned to the ward in good condition.

A measurement of the globe showed the following dimensions: horizontal equatorial, 23 mm.; vertical equatorial, 24.5 mm.; antero-posterior, 24 mm. Tension slightly plus, sclera greatly thinned, with the choroid showing through, anterior chamber shallow and aqueous turbid. The vitreous chamber was apparently filled with the yellowish-white material that had been described by the mother. At the time the globe was received it was unfortunately necessary to freeze it and divide it immediately; the section was made in the horizontal meridian; a cover slip smear was made; one half of the globe, with a portion of the swollen nerve, was placed in 10 % formalin solution and reserved for special stains, while the other half of the globe, the orbital contents, and the remaining portion of the nerve was placed in 10 % formalin solution and passed through the alcohols for embedding in celloidin. The cover slip preparation was stained with methylene blue and a microscopic examination made. It was found to be composed largely of round and oval cells (medium-sized) with small amount of protoplasm and relatively large granular deeply staining nuclei, lying within a fine reticulum which stains faintly. A number of pale granular cells with relatively more protoplasm and faintly staining nuclei, resembling

in form and size those described before. Also fat detritus, pigment, and polymorphonuclear leucocytes. No bacteria. The macroscopic examination of the globe presented the following changes. Sclera generally thinned but particularly in the equatorial region, except posteriorly in the region of the nerve it is much thicker than normal. The lens is pushed slightly forward, encroaching upon the anterior chamber, which is filled with a grayish white exudate. The iris and ciliary body appear atrophied. The optic nerve at the papilla is directly connected with the vitreous mass and measures at this point, from one margin of the sclera to the other, 3 mm. The vitreous chamber is filled with the yellowish white mass.

Microscopy of the globe—haematoxin-eosin stain.—The cornea is histologically normal; the anterior is filled with a faintly staining exudate containing a few polymorphonuclear leucocytes; the posterior surface is covered with this exudate; the anterior capsule of the lens is detached and broken and the anterior surface is covered with exudate; exudate also covers the surface of the iris which is in contact with the cornea at the angles of the chamber. The pupillary margin of the iris is pushed forward by the exudate and is embedded in the mass. The iris and ciliary body are atrophic and show old inflammatory changes. Beneath the anterior capsule of the lens, which is broken, there is a corresponding break in the lens substance extending to the nucleus; it is funnel-shaped and has been invaded by the growth cells. The sclera is greatly thinned at the equator. The choroid is almost entirely destroyed by the cellular invasion; the portions remaining are very atrophic. Posteriorly the sclera has been invaded by the cells, the fibres having been pushed apart, at times completely enclosing the cellular masses. There are no traces of retinal structure. The entire vitreous chamber is filled with the growth, which is in

various stages of degeneration; stained, these changes can be seen by the naked eye, the more perfect cells taking the blue stain distinctly. Large blood spaces filled with blood are seen, their imperfect walls formed by the cells arranged irregularly without apparently any attempt at form. At times the more perfect cells surround these blood spaces, resembling the perivascular rosette formations which have been described by writers. The walls of the smaller blood spaces, some of which are fairly well formed, are at times thickened by the terminations of the cell processes. The vessels contain blood. Spaces identical with those just described are also seen, that do not contain blood. The anterior chamber has been invaded by the cells, which are arranged in groups.

Optic Nerve.—Macroscopically it was soft, yellowish white; in its longest diameter measures $9\text{ mm} \times 8\text{ mm}$. Microscopy—H. & E. stain: The normal nerve tissue has been almost entirely replaced by cellular elements and a fibrillar intercellular substance, the cells resembling those described before, *i.e.*, round or oval cells with small amount of protoplasm and relatively large granular nuclei. Some of these cellular areas are separated by large blood spaces filled with blood, and show various stages of regressive metamorphosis the same as in the globe. At times these degenerated areas resemble miliary tubercles, at other times the areas are separated by faintly staining glistening fasciculi that become continuous with the cellular masses at their extremities. These fasciculi, which are connective tissue, are probably the modified fibrous partitions separating the normal nerve bundles. Some of the degenerated areas are undergoing beginning calcareous change. The blood spaces are without definite walls being irregularly enclosed within the cellular masses and varying greatly both in form and size. The more perfect cells take the stain deeply and lie in a fine fibrillated,

groundwork. These gross changes can also be seen in the stained section with the naked eye. The pial sheath of the nerve is ruptured in places, allowing the escape of the cells, which are scattered in great profusion throughout the subarachnoidian space, which structure is at times quite destroyed. The walls of the sheath are greatly thickened, and some of them have undergone hyaline change. They generally contain blood.

In some of the blood-vessels a very curious formation exists: within the lumen of the vessel are elongated cells, their apices in contact with the degenerated lining of the vessel; the periphery of the cell, which corresponds to the centre of the lumen, bears a granular nucleus resembling those before described; the peripheral extremities of these cells (if they may be called such) are united by a thin homogeneous line which practically forms the lumen of the vessel, because contained within this line is blood; this line and the lines separating the cells do not take the stains, and show by contrast against the body of the cell; from without in, then, is seen the adventitia, the thickened media, the intima, the degenerated endothelium and the layer of cells and blood. The cells are sometimes grouped more or less regularly outside the vessels and the inter-cellular substance is lost in the adventitia. Rosettes could not be found in the nerve proper or anything resembling them. Just outside the dural sheath a circumscribed mass of cells is seen, the intercellular substance predominating and the whole surrounded by a fibrillated covering which stains faintly with eosin, and at times becomes continuous with the intercellular substance. Mallory's aniline water gentian violet and phosphotungstic-acid haematoxylin, Mallory's stain for connective tissue, stains for bacteria and for elastic fibres.

The growth proved to be neurogliar in nature, the cells and fibres taking the deep blue stain, the degenerated areas appearing faint blue; the rosette formations de-

scribed are formed by the fibres of the cells, some of them directly connected with the cells, with varicosities occurring in the course of the fibres. In the perivascular rosettes the walls of the blood-vessels are thickened by the terminations of the fibres. The arrangement of the cells found within the walls of the blood vessels of the sheath were found to be neuroglia cells, the fibres of which form the boundaries of the spaces, while the homogeneous non-staining fibres take the blue stain and some of them are directly continuous with the cells. The lumen of the vessel now is marked. The circumscribed mass of cells found in the tissues just outside the dural sheath of the nerve is composed of neuroglia cells, the fibres forming the intercellular substance predominating and taking the blue stain deeply. The fibrillated covering stains blue, the fibres within the covering at times becoming continuous with it.

A brief clinical history of the patient while in the hospital:
12.10.02. Operation. 12.11.02. Child fretful throughout the night, no indication for a change of dressing. 12.13. Dressing removed, orbit clean, no discharge; the child has been fairly comfortable, but at times irritable. 12.15. Outer dressing changed, but packing not removed. 12.22. Dressing changed every two or three days; no infection, no discharge, patient quite irritable, orbit granulating, lids rapidly inverting. 12.29. Dressing changed every other day; granulations springing up, no infection, child very weak; has irregular attacks of vomiting without apparent cause, most often in the morning, and apparently reflex in nature. 1.4.03. Orbit clean, no evidences of infection, vomiting continues. 1.12. Orbit granulating rapidly, slight healthy discharge, vomiting more frequent, child less irritable, and markedly moribund. 1.19. Vomiting more frequent, weakness increasing, child hardly able to move. Emaciation increasing rapidly, mass of pouting granulations presenting in orbit. 1.26. Progressive weakness, meningitic cry, orbital mass ulcerating, very offensive brownish discharge. 1.31. Patient died,

having been comatose for the last three days; took nourishment mechanically, but was unable to retain any food on the stomach.

Two days after death, by permission of the parents, an autopsy was held. The following specimens were removed—brain, spinal cord, the posterior segment of the unaffected eyeball with the optic nerve, liver, kidneys, spleen, heart, and lungs. Macroscopic—the base of the brain was a soft pultaceous mass that was removed with great difficulty; the optic nerve of the affected side had completely melted away. The liver contained upon its surface in all five, quite round, grayish white tumors which projected 3 or 4 mm. above the surface and averaged in diameter from 5 to 3 mm. One of these new growths was seen upon the anterior surface of the right lobe, one upon the superior surface, and one upon the posterior surface. One was found upon the anterior surface of the left lobe and one upon the inferior surface. When cutting into the substance of the liver it was found to be extensively involved, the grayish white masses arranged in the form of tubes, the sides of which were well circumscribed, the extremities fading into the liver tissue. These plugs varied in length from 5 mm to 1 cm. The other specimens, upon dissection, showed no changes worth noting. The optic nerve of the unaffected eye appeared normal. The specimens were preserved in 10% formalin solution; portions of the tissues were hardened in alcohol, embedded in celloidin, cut and stained in haematoxylin and eosin; other portions were reserved for special stains. Optic nerve and retina of the supposed sound eye—haematoxylin and eosin stain: these structures are involved in the growth, the subdural and subarachnoid spaces being literally plugged with the cell mass. The cells of the nuclear layers of the retina show degenerative changes; the regular arrangement of the cells is broken up, the cells lying in

groups and clumps. Occasionally only shadows of cells are seen, and these consist in round or oval collections of fine faintly staining granules without a definite wall; these cells under the lower powers give the appearance of a fine granular intercellular substance. The entire retina is disorganized; the nerve fibre layer is thickened and infiltrated with leucocytes and glioma cells. The base of the brain was extensively involved, almost completely disorganized. Owing to an accident a detailed examination was not possible.

A specimen of the liver tissue was submitted to Dr. B. M. Randolph of Washington, D. C., who reports the following: "The portion of liver tissue submitted for examination contains a grayish white nodule, soft, about one third of an inch in diameter. Tissue embedded in paraffin stained with hæmotoxylin and eosin; also with Mallory's stain for connective tissue and neuroglial fibres. Microscopic examination shows: A mass composed entirely of cells, round, of symmetrical outline, and has a sharply defined capsule of adult connective tissue. This capsule sends a few trabeculæ into the substance of the tumor. The tumor cells are closely packed together and vary greatly in size. The most prominent types are: (a) A very large cell with a large round (sometimes ovoid) nucleus. The protoplasm is scanty, very indistinct, and often impossible to demonstrate. The periphery of the nucleus is very clearly defined. Its interior stains faintly, sometimes hardly at all; scattered sparsely through it are coarse granules which stain deeply with hæmotoxylin. (b) A cell similar in structure to the preceding but about half the size, and the granular structure of whose nucleus is more abundant, giving an appearance of staining more deeply and uniformly. These two are the prevailing types; other cells are found intermediate between these two and still smaller than (b). The whole cell mass is infiltrated with red blood cells, and of course lympho-

tes, and polymorphonuclear leucocytes are found. Quite a number of very minute round bodies are observed, which stain with haematoxylin, and are hardly larger than some of the large micrococci, probably granules derived from breaking down of the nuclei of the large cells. Embryonic blood-vessels are present. Some fibrillar bands of connective tissue are seen, evidently derived from the trabeculae proceeding from the capsule. Immediately outside the capsule there is a narrow zone which is the seat of a pronounced fatty degeneration. Further than this there is no involvement of hepatic cells. The venous and capillary system is engorged. There is a slightly round-celled infiltration of the interstitial connective-tissue, and the adventitia of some of the blood-vessels. Several are found where a vessel contains cells similar to those found in the tumor mixed with the normal blood cells, and sometimes these cells seem to form an embolus. It is observed that such a vessel communicates directly with a tumor mass such as that described above. The character and arrangement of the cells of this hepatic growth correspond exactly to the primary growth found in the retina, and in the extensions found in the optic nerve and spinal cord. Its presence in the liver is evidently of metastatic origin, as is shown by its relations to the hepatic tissue, and by the presence of tumor cells found in the blood vessels. Without undertaking to enter into a controversy over nomenclature, I classify the growth as a metastasis to the liver from what is commonly called malignant glioma of the retina."

The sheath of the spinal cord was filled with cells of the growth. There were no changes in the other organs of special interest.

REPORT OF THE MEETINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

BY MR. C. DEVEREUX MARSHALL.

THURSDAY, JANUARY 31, 1907. PRIESTLEY SMITH, F.R.C.S., PRESIDENT, IN THE CHAIR.

Mr. SIMEON SNELL (Sheffield) related a case of tubercle filling the eyeball in which the opsonic index was regularly taken. The patient was a boy aged twelve. Before coming under Mr. Snell's care in April, 1906, he had been under surgical treatment for tuberculous abscesses in the arm and leg. At the time when he was seen the sight of the left eye had begun to fail four months before, and then the left eye was prominent and apparently slightly larger than normal; the conjunctiva was injected, but there was no pain. Vision was lost. The interior of the eye was occupied by a mass of yellowish-gray material on which retinal vessels were seen. Tubercle of the choroid and vitreous was diagnosed. Immediate enucleation was decided against. A little later the eye became inflamed and painful, its tension was raised and its size increased, and the interior became more filled up. Tuberculin injections were then tried, and the opsonic index was regularly taken. Tuberculin injections of $\frac{1}{10}$ mg were twice given. The boy was greatly benefited, the eye became smaller, and the mass in the interior was thought to be caseating. The eye was removed on Sept. 17th, by which time it was no larger than normal. The boy did perfectly well after the operation. Examination of the globe showed it to be tuberculous, but bacilli were not found. The choroid was the structure the most affected.

Mr. Snell also related particulars of a family, several of whom had suffered from nyctalopia. The earliest ancestor who suffered was the patient's grandmother. Information was obtained of sixty-three of her descendants extending to the fourth generation. Out of sixty-four, twelve were affected with nyctalopia, nine being males, and three females.

A peculiar feature was that the males had girls affected, and boys healthy, and the females had boys affected and girls healthy.

Mr. ARNOLD LAWSON related two cases of acute streptococcic infection of the conjunctiva. Case 1 occurred in a child sixteen days after birth. At first there was some swelling of the lids and a muco-purulent discharge. After ten days the cornea became infiltrated and the case ran a rapid and acute course. A tough conjunctival membrane developed, and within thirty-six hours of the first affection of the cornea the sight was hopelessly destroyed. The general health was not affected. Swabs taken from the conjunctiva showed almost pure cultures of *streptococcus pyogenes*. Mr. Lawson did not see the case until the cornea were infiltrated, and nothing seemed of any avail in allaying the course of the disease.

Case 2 occurred in a child convalescing from scarlet fever who was then attacked with measles. Ten days later the temperature was high and fluctuating as seen in pyæmia, at the same time brawny swelling of the lids commenced. After a few days the discharge increased rapidly, and the cornea became suddenly infiltrated, and within twenty-four hours the condition was hopeless, and palpebral and ocular conjunctivæ of both eyes were covered with a dense yellow tenacious membrane. The child was exceedingly ill, and recovery was doubtful. The sloughs eventually separated but the cicatricial contraction of the conjunctiva was very severe. The infection was a mixed one due to *staphylococcus pyogenes aureus* and *streptococcus pyogenes*. The contraction in both cases was very severe, and in neither case did treatment seem of the slightest avail in arresting the course of the disease.

Mr. BROOKSBANK JAMES read some notes on stereoscopic vision. He remarked that most experiments which had been

carried out had been conducted at comparatively short distances. He described an apparatus which he had introduced in order that the same may be estimated at the usual testing distance of say six metres. The apparatus was simple and at the same time most delicate in the estimation of the third dimension. It consisted of a box in which only the floor and end walls remained, the sides and roof having been removed. In the front wall was an oval aperture in its centre. At each side was an electric lamp which illuminated the interior, the front and back walls were covered with black velvet. The floor was pierced with numerous round holes, each separated by an interval of about an inch. The test objects were white painted sticks of different sizes, and they were long enough for each extremity to be hidden behind the margin of the aperture in the front wall of the instrument when placed upright in the holes. In this way it was found impossible for a person using one eye only, to tell whether one stick was in front of the other, they always appeared to be in the same plane. The apparatus could of course be used at any distance, and it afforded a convenient way of ascertaining the quality of the stereoscopic vision in cases of partial amblyopia of one eye.

Mr. James alluded to the theories held with regard to the estimation of the sense of depth, and also to the importance of recognizing the several grades into which binocular vision can be divided.

THURSDAY, FEBRUARY 14, 1907. R. W. DOYNE, F.R.C.S., VICE-PRESIDENT, IN THE CHAIR.

The evening was devoted to the discussion of clinical cases. Mr. LUDFORD COOPER showed a case of paralysis of the vertical movements of both eyes. The patient was a man in whom there was complete paralysis of the vertical movements of both eyes, which had come on suddenly and for which no explanation could be found. Mr. J. H. Fisher had seen two similar cases, one in a girl who was found one morning unconscious with this paralysis. She recovered consciousness rapidly, but the paralysis persisted for a long time. The explanation he then gave was an embolism of one of the small arteries of the corpus quadrigeminum. The other case

showed hemianopic pupil reaction, without a hemianopic field, a condition never before recorded, and post mortem a diffuse growth of the lamina quadrigemina was found.

Mr. A. Stanford Morton showed a case of a man aged fifty-four who, two years previously, received a steel foreign body in his right eye. The sight of this was immediately affected. About a month later, the sight of the left began to fail, and within three months he was almost completely blind. Now the right eye showed typical siderosis, with atrophy of the nerve. The left eye showed a similar condition of the disk, the atrophy being of the post-neuritic type; there was marked arterial sclerosis in both eyes. The left pupil showed the Argyll-Robertson reaction. No sign of central nervous disease could be found.

Mr. MALCOLM L. HEPBURN showed a case of a man, aged sixty-one with polycoria associated with chronic glaucoma. The sight of the right eye had become dim recently, though for the last three years he had noticed colored rings around the lamp; he had had no pain. The left eye was normal in every respect. The right eye showed an unusual appearance of the iris which he stated had been present from birth. There was a complete pupil placed down and in which reacted to light, while the part between the pupil and the periphery was made up of five triangular-shaped bands of pigmented iris tissue, with their bases towards the angle. These bands enclosed clear spaces, through any of which the details of the fundus could be plainly seen. In addition to these bands, an almost complete circular stump of pigmented tissue was visible at the angle of the anterior chamber, in which the bases of the different bands were lost. The patient stated that the pupil used to be in the centre of the eyeball, but of late years it had gradually come to occupy its present position. The fundus showed glaucomatous cupping of the disk. The case was interesting from a developmental point of view, and two explanations were possible: one that the iris was originally complete, and by subsequent atrophy, as the result of inflammatory action or otherwise, had partially disappeared; the other was a faulty development, which was difficult to understand, since the pupil was perfectly formed.

Mr. TREACHER COLLINS suggested as a possible explanation the failure of the formation of some of the loops of vessels which go to form the iris.

Mr. WAREN TAY showed a drawing of an eye from a case of tuberculosis, which was only diagnosed after an ophthalmoscopic examination had been made. This occurred twenty-two years ago. He showed this in order to disprove the statement of an eminent physician who stated that this had never been done.

Mr. J. H. TOMLINSON showed a retinoscopy longarm to facilitate the practice of retinoscopy in children.

Mr. HALLIBURTON McMULLEN showed a case of detachment of the retina cured by scleral punctures.

Other cases were shown by Messrs. G. W. THOMPSON and G. H. POOLEY.

REPORT OF THE THIRTY-THIRD MEETING OF
THE OPHTHALMOLOGICAL SOCIETY AT
HEIDELBERG, AUGUST 6-8, 1906.

REPORTED WITH AUTHORS' ABSTRACTS BY DR. K. WESSELY.

Translated by Dr. MATTHIAS LANCKTON FOSTER.

FIRST SCIENTIFIC SESSION, AUGUST 6TH. DR. STRAUB PRE-SIDING.

1. NAGEL (Berlin). A contribution to the knowledge of the vision of deuteranopes. Nagel has investigated the vision of many dichromates, especially the green-blind, by simultaneous stimulation of large retinal areas. Persons who are typically deutanopic with pure foveal vision make distinctions of color with a larger field which presuppose the presence of a trichromatic system. It is not yet certain whether the system is normal or abnormal. In a visual angle of at least ten degrees red is positively distinguished from all other colors. Green is much less positive, but it gives rise to a distinct red after-image. The minimal time for the discernment of colors is markedly increased, the same as in anomalous trichromates.

2. FUCHS (Vienna): Etiology of cataract.

Fuchs has shown in a former work that deposits on the posterior surface of the cornea and the formation of cataract are present in heterochromia usually in the blue eye. These persons have black hair as a rule. The same causes of disease which in these cases are made manifest in only one eye may also affect both. Then there are persons with black hair and blue irides who later have deposits on the cornea and cataract. Fuchs has observed two groups of these cases. One includes

persons between the ages of thirty and fifty who develop a bluish-white cataract either monolaterally or bilaterally. The nucleus is found to be soft and cloudy at the operation. Deposits are very frequent in these cases. The other group includes old people with ordinary senile cataract. The histological examination of the piece of iris excised at the time of extraction of the cataract showed in pathological cases a moderate increase of nuclei in the anterior layers of the iris and the pupillary zone. The coincidence of black hair with a blue iris is usually the result of a cross of a dark with a fair race, and in such cases the eyes may not be diseased. In the cases affected by the described disease it must be assumed that the light color of the iris is due to a pathological influence which prevented the proper formation of pigment. The conclusion of the writer is that certain persons with black hair and blue irides have a predisposition to chronic cyclitis and cataract.

3. ROEMER (Wuerzburg): **Metabolism of the lens and the action of poisons upon it.**

Roemer's research involved the examination of 30,000 lenses. The true metabolism of the lens is its nutrition through suitable substances, and experiments with extraneous substances tell us nothing about the nutrition of the lens because such substances are not assimilated or have a poisonous effect.

The osmotic pressure of the intraocular fluid is usually the same as that of the serum, but it may be either higher or lower. This is because the osmotic pressure of the serum is subject to constant fluctuations which are communicated to the intraocular fluid. The lens is accommodated to the physiological fluctuations of the intraocular osmotic pressure, just as the blood cells are accommodated to the fluctuations of the osmotic pressure in the serum. The increase of the osmotic pressure of the aqueous in naphthalinic cataract belongs among the physiological fluctuations.

Differences in weight between lenses from similar eyes are much more frequent and important than we have supposed. Therefore conclusions cannot be drawn from the differences in weight in regard to the etiology of senile cataract. The method of removal of the lens from the eye has an influence upon the proportionate weight and the reception of substances.

All investigations regarding the metabolism of the lens in vitro must depend on how long and under what conditions the lens in vitro is to be looked upon as surviving. The spontaneous signs of necrosis of the lens are to be determined from (1) the loosening between the epithelium and the capsule, (2) the weight test, (3) the quantitative determination of the albumin escaping from the lens. Lenses will not survive longer than ten hours in the temperature of an incubator, from fifteen to twenty hours in the temperature of a room, and twenty-four hours in that of a refrigerator. These signs of necrosis are not to be considered in diffusion experiments. In enucleated eyes the time of necrosis is the same.

A $\frac{1}{2}$ per cent. salt solution is not isotonic for the lens, but hyperisotonic. The escape of albumin from the lens is wonderfully dependent on the temperature under the influence of the same harmful substances. It has not been satisfactorily determined in diffusion experiments with extraneous substances whether these are indifferent or toxic to the lens.

The basis of an understanding of the processes which take place in senile cataract must be laid in a toxicology of the lens. The lens is a suitable organ from which to gain information in regard to the connection between chemical constitution and action. From the standpoint of the investigation of senile cataract it is to be determined whether the types of toxic actions produced in the lens by definite chemical poisons correspond to the processes which take place in senile cataract, or are due to the receptor mechanism.

The production and excretion of acetone in senile cataract is the same as in the non-cataractous. The percentage of substances soluble in ether among the constituents of the lens is the same in age as in youth. The increase of the substances soluble in ether in senile cataract is the result, not the cause, of the cataractous condition. Acetone and other lipoid solvent substances of metabolism exercise no injurious action on the lens. With the lipoid hypothesis as it has hitherto been, the possibility could not be excluded that injurious substances might be hoarded up in the lens. Of poisons, such as saponin and tetanolysin, which have the same haemolytic reaction, the first unites with the albumin not at all, while the latter unites with it in a specific manner.

Further advances in the knowledge of the pathology of the lens can be obtained only through immunization of the lens. This Roemer claims to have accomplished in large animals. By means of his lens antiserum a new operation can be elaborated by which the albumin of the lens can be specifically recognized, and with the help of this method it can be determined whether the albumin in the aqueous in cataract comes from the lens or the blood. We can further distinguish when the configuration of the albumin of the lens of mammals appears in animal evolution. The immunization of the lens has also rendered it possible to penetrate more deeply into the relations of the lens to the serum. In the serum of adults are found auto-antibodies which are directed against their lenses. These have the appearance of amboceptors and are wanting in the blood of the healthy foetus.

The study of the admittance of the antibodies into the lens reveals the new law that the lens capsule can be passed by such receptors of the serum alone as those for which specific affinities are present in the lens capsule.

Discussion on Numbers 2 and 3.

PETERS believes that permanent osmotic differences of pressure may exist for the lens. A toxic action on the lens may cause not only cortical but also lamellar cataract, as in tetany. He systematically inquires in cases of senile cataract whether the history may reveal anything of former latent attacks of tetany and is surprised to find it so often.

E. v. HIPPEL reported as an addition to his former studies on the production of lamellar cataract by the X-rays that by injection of lecithin and cholin into the mother animal he has been able to produce lamellar cataract in the young.

VON PFLUGK recommends for the clearing up of incipient cataract systematic subcutaneous injections of a 2% solution of iodide of potash.

4. STOCK (Freiburg): A peculiar form of **amaurotic family idiocy**.

Stock examined three children in one family who became idiotic and blind when they were six years old. The clinical picture differed from that described by Tay-Sachs, in

that no paralyses were present and the blindness first appeared in the seventh year. The pathological differences are also marked. In Sachs's idiocy there is an extensive destruction of fibres together with degeneration of the ganglion cells in the brain, an optic atrophy with degeneration of the ganglion cells, while the layer of rods and cones always remains normal. In Stock's cases the examination of the brain revealed a normal system of fibres, the ganglion cells damaged internally. In the eyes the layer of rods and cones was totally wanting. The ganglion cells were for the most part preserved, but internally changed; the layer of nerve fibres and the optic nerve were normal. In two cases the retina had become secondarily pigmented, so as to present the picture of retinitis pigmentosa, while in the third case the fundus was clinically normal.

The choroidea, especially the chorio-capillaris, was absolutely normal over large areas, showing that this was a primary disease of the layer of rods and cones. It could not be determined whether the rods and cones were destroyed by a toxin formed in the body, or were congenitally too weak in accordance with Edinger's theory.

The author compares the retinal degeneration with the condition present in a typical retinitis pigmentosa. At the places where the destruction of the rods and cones began the choroid was normal, and he therefore considers the disease a primary one of the retina. But while in the idiots the optic nerves of the blind eyes were found to be normal, in typical retinitis pigmentosa with a small central visual field there is a very marked atrophy of the optic nerve. In this respect the two processes differ very materially.

Discussion.

AXENFELD spoke of a case of marked ring-shaped retinitis pigmentosa in which the other early symptom of hemeralopia in the region of the non-pigmented portion of the retina was strangely wanting.

SCHMIDT-RIMPLER recalled a similar case.

5. HERTEL (Jena): Experimental investigations regarding the contraction of the pupil to the stimulation of light.

Hertel reported a series of experiments in which he succeeded in obtaining a contraction of the pupil by means of light in rabbits, cats, and man after interruption of the reflex oculo-pupillary tracts.

After section of the optic nerve the pupils of neither rabbits nor cats showed any contraction to gas or daylight, even when the animals had remained in the dark for a long time. But exposure to the electric arc light produced a slow though distinctly measurable contraction. This slow contraction of the pupil to the arc light could also be demonstrated in men who had absolute amaurosis due to injury of the optic nerve from fracture of the base of the skull, though there was no response to gas or daylight. The same difference in the behavior of the pupils according to the source of light used was not present in the enucleated eyes of frogs and fishes; in these the slow contraction took place also with gas and daylight.

This peculiar difference in the action of different sources of light upon one and the same organ is explained by a second series of experiments with spectral light. The author shows first of all that in the test of the physiological action of the different spectral fields the great differences between the total energies in the individual fields must be taken more into account than has been customary. As in former experiments, therefore, he first ascertained thermo-electrically the total energy of the spectral field employed for irradiating the iris, and then instituted the experiment of stimulation of the iris tissue. Thus it was ascertained that the short-waved, ultraviolet waves required the least exertion of energy to produce stimulation both in cold-blooded and in warm-blooded animals, and the value in each was about the same. But with increasing wave-length the exertion of energy required by the iris became greater and greater in the warm-blooded animals as compared with the cold-blooded.

The explanation of this advanced by the author is that the reception of the radiant energy, on which according to his former investigation the different action on the organism of rays of different wave-lengths depends, is alike in the irides of warm- and cold-blooded animals only in the short-waved ultraviolet portion of the spectrum and able to produce

equally great effects. But the long-waved rays are more easily received by the iris of a cold-blooded animal, the sphincter of which contains pigment, than by that of a warm-blooded animal whose sphincter contains no pigment, and therefore a less exertion of energy is necessary to stimulate the sphincter of a cold-blooded than that of a warm-blooded animal.

The different effect of gas and daylight on the one side and of the electric arc light on the other is likewise explained, but at the same time the pupillary contraction described is referred to a direct stimulant action of the radiant energy on the sphincter of the iris.

Discussion.

HIRSCHBERG has been able to obtain a pupillary reaction from sunlight in men with atropine mydriasis. A notice of the enormous contraction of the pupil in sunlight may be found in a work of the sixteenth century.

UINHOFF inquired whether the author would ascribe the occasional persistence of the pupillary reaction in optic atrophy and absolute amaurosis to a direct stimulation of the sphincter.

HERTEL replied that his explanation applied only to the case which he had described in which the optic nerve was beyond doubt totally divided.

6. KRUECKMANN (Leipsic): **Degenerations of the retina, particularly in connection with arteriosclerosis.**

Krueckmann says that all histologically demonstrable forms of retinal degeneration can occur in connection with arteriosclerosis of the vessels of the fundus. The retinal degeneration appears almost exclusively in the glia constituents in the ophthalmoscopic picture, composed of white glistening spots, pigmentation, and the perivascular glia mantles. The white spots in the retina are formed of fatty granular cells. These fatty granular cells are associates or descendants of the neuroglia and therefore identical with glia cells containing fatty granules. They take care of the resorption of degenerated nerve elements, particularly of the so-called varicose nerve fibres, and also remove intraretinal

hemorrhages and homogeneous masses of albumin. The glia nature of the fatty granular cells can be demonstrated ophthalmoscopically when the cells of the anterior glia ring contain fatty granules. The retinal changes in chronic nephritis, in diabetes, and in the so-called retinitis circinata may be classed as results of arteriosclerosis. The senile form of arteriosclerosis may be described as an extremely frequent but comparatively harmless affection, yet to it must be ascribed the senile changes at the macula. Finally, it is remarked that the neuroglia is to be looked upon almost as the manager of the retina because of its nutrient influence upon the nerve elements.

7. **VON HIPPEL** (Heidelberg): The significance of **trauma** in the etiology of parenchymatous keratitis.

In the discussion of the traumatic origin of parenchymatous keratitis a sharp distinction must be maintained between the typical form which is usually due to hereditary syphilis or tuberculosis and those parenchymatous opacities of the cornea which are caused by foreign bodies, injuries with chemicals, and contusions with lesions of the endothelium. In the latter the dependence upon the trauma is self-evident, while there are only twelve reported cases of typical parenchymatous keratitis in which there was a positive traumatic origin. This number of cases is much too small to exclude an accidental coincidence of traumatism and keratitis, and in not a single case was it proven that the disease had not begun before the occurrence of the injury. The localization of syphilitic and tuberculous processes in other organs affected by traumatism should not be considered, because in parenchymatous keratitis there is in general no direct specific product in the cornea. Finally the explanation of the disease of the second eye presents the greatest difficulties, unless the unproved idea of sympathy is adopted, that is, that in these cases the parenchymatous keratitis is transmitted by vaso-motor influence. Therefore a causal connection between traumatism and typical parenchymatous keratitis is not proven, but perhaps future experience may yield a different result.

8. **PFALZ** (Düsseldorf): Double parenchymatous keratitis

(sympathetic?) after superficial injury of the cornea of one eye.

A man thirty years old who had always been well with the exception of an inflammation of the lungs twelve years before, and who had no signs or history of hereditary disease, had a superficial injury of the right eye from a foreign body which was removed two days later. Four days after the injury, two after the removal of the foreign body, an opacity appeared in the cornea which was diagnosed by the writer on the eighth day after the injury as a parenchymatous opacity. It was most marked in the lower-outer part of the cornea, while in its upper-inner margin were traces of rust in a little infiltrate. The opacity spread in spite of treatment, and four weeks after the appearance of the disease in the right eye it appeared in the left and extended from the upper-inner margin over the entire cornea. After three months the right cornea began to clear up from the margin and the disease disappeared after six months. In the left the disease was more obstinate. As in the right, the opacity became disk-shaped, but the margin was denser and formed in the course of the disease a vertically oval ring constantly becoming smaller, which persisted alone for a long time, became punctate after the lapse of seven and a half months, and finally cleared up and disappeared. The cornea always remained non-vascular. The signs of irritation were always slight, confined to a bad reaction of the iris to mydriatics during the maximum stage of the disease. After nine months there was perfect *restitutio ad integrum* except for the slight scar from the injury to the right eye. Regarding the diagnosis the author points out the similarity of the clinical picture to that of *keratitis disciformis*, but the course was more favorable than is the rule in this disease. A secondary parenchymatous oedema resulting from an infectious disease of the epithelium is to be thought of, but is rendered improbable by the course and is to be excluded on the left side, where the clinical picture was finally that of *keratitis annularis*. The author believes that the traumatism was the cause of the disease in both eyes. The presence of syphilis or tuberculosis could not be absolutely excluded, but was rendered improbable both by the absence of all symptoms and by the course of the disease. What exciting cause of the

disease was present cannot be told. The influencing of the second eye by the disease in the first, as in the similar cases reported by Brommer, Czapodi, Dodd, and Perlia, makes one think of the possibility of sympathetic parenchymatous keratitis in the case of a traumatic parenchymatous inflammation of the cornea, perhaps with involvement of trophic nerve tracts. The great rarity of such cases renders a positive judgment impossible.

Discussion on Numbers 7 and 8.

HUMMELSHIEM claimed that in the interest of the avoidance of differences of judgment in regard to accident indemnity it was important to unite on one point in this question. Even though the disease in the second eye was not yet explained, the fact of the traumatic excitation of the disease in the first eye remained and therefore it would be better to decide in such cases in favor of the injured.

GREEFF reported a case of double-sided parenchymatous keratitis after a lime burn in a sixteen-year-old boy who had hereditary syphilis and thought it probable that the injury may have been the exciting cause.

PETERS considered that only the atypical parenchymatous keratitis was proven to be the result of a traumatism.

AUGSTEIN, HESSBERG, and LIMBURG spoke in favor of the dependence of parenchymatous keratitis upon traumatism, and the first particularly said that he had frequently obtained such histories from children.

SCHIRMER thought it very improbable that the traumatism was the exciting cause for the reason that parenchymatous keratitis is a metasyphilitic disease.

MONDAY AFTERNOON, AUGUST 6TH. FIRST DEMONSTRATION SESSION. DR. EVERSBUSCH (MUNICH), PRESIDING.

1. KRUECKMANN (Leipsic): Demonstration illustrating his paper.

2. STOCK (Freiburg): (a) Hæmatogenous tuberculosis of the eye and lids in rabbits.

Stock showed pictures of the lids of rabbits in which nodules

could be clinically seen that resembled chalazia. Tuberculous tarsitis was demonstrated pathologically, and the bacilli were to be seen. He believes that those who have found tubercle bacilli in chalazia in men have had to deal not with chalazia, but with tuberculous tarsitis.

He then exhibited pictures of a sclerosing keratitis in a rabbit infected with tuberculosis by way of the blood current. This sclerosing keratitis was pathologically a tuberculosis extending from the ciliary body which had involved the sclera and cornea.

(b) Experimental keratitis parenchymatosa produced by general infection with trypanosoma Brucei in a dog.

Stock demonstrated specimens of an eye of a dog infected with trypanosoma Brucei, in which the cornea presented clinically a parenchymatous porcelain whiteness. The opacity was chiefly due to an oedema of the cornea. Infiltration was present only in the centre of the cornea, where there were also newly formed vessels. There was also a very severe iritis. The presence of trypanosomata in the aqueous was positively demonstrated by inoculation of a mouse. Stock could not say whether the parenchymatous keratitis and iritis were due to the presence of the trypanosomata themselves, or to that of their products. The trypanosomata were not stained on the slides, but this did not show that none was present. They make formations in the body with which we are not yet very familiar.

He then demonstrated a preparation for Dr. Gierke. In the normal cornea of a syphilitic foetus were masses of spirochaetæ. The presence of these germs did not immediately set up an inflammation in the tissue.

3. PETERS (Rostock): Microscopic preparations of injuries to the cornea during labor.

The eye of an infant whose cornea was injured by the forceps at birth was examined anatomically three weeks later. There were several lacerations of Descemet's membrane, and in the anterior chamber was a peculiarly rolled piece of the same covered on both sides with endothelium. He also reported the examination of a syphilitic seven months' foetus in which spirochaetæ were found in a normal cornea.

4. BACH (Marburg): Method of examination of the pupil.

Bach urged a more uniform examination of the pupil made under similar external circumstances. He gave several examples to illustrate the inadequacy of reports on pupillary conditions hitherto. He considers that in abnormal conditions of the pupil four things should be determined: (1) The diameter of the pupil in reduced illumination; (2) the diameter of the pupil under strong exposure of both eyes to light; (3) the diameter of the pupil under strong exposure of one eye to light; (4) the diameter of the pupil during convergence. He then showed by a series of examples that a great many disturbances can be easily analyzed by his method.

5. STRAUB (Amsterdam): Data regarding statistics of refraction in Amsterdam.

Straub demonstrated: (1) Curves which showed that in Amsterdam school children of the same age have greater chances of myopia the greater the tuition paid; (2) curves which showed that less myopia is produced in the schools in which the arts and sciences are taught than in the classical gymnasias; (3) curves of all the myopes in the Poliklinik arranged according to age, which showed that the frequency of the slight myopia gradually passed over into that of high myopia. The curves lacked the two apices which would be expected if in these persons high and slight myopia were two distinct diseases.

6. DIMMER (Graz): (1) Demonstration of microscopical preparations; (2) demonstration of photograms of the fundus.

Dimmer exhibited an album which contained 250 photograms of the normal and pathologic fundus which he had taken with the apparatus devised by him in 1902, together with enlargements from them, and illustrating almost all kinds of changes in the fundus. He also showed microscopical preparations of a case of partial evulsion of the optic nerve caused by an injury received at the inner canthus, and specimens showing the formation of cavities in the optic nerve produced apparently by the action of solutions of formol or sublimate. They lay posterior to the lamina cribrosa and were differentiated readily from pathological changes.

7. SCHREIBER (Heidelberg): Formation of excrescences of the pigment epithelium after experimental section of the ciliary arteries in a rabbit.

Schreiber exhibited microscopical preparations of the formation of excrescences of the pigment epithelium of the retina, which he had observed in a young rabbit six months after partial division of the ciliary arteries. This condition is of special interest, first, because such formations have never before been described in animals, second, because they appeared as the result of an experiment, and, third, because their localization is unusual. They were found in close relation to the pigment epithelium, not only on the outer surface of the retina, but also within the retina and on its inner surface just beneath the limitans interna.

8. NAGEL (Berlin): Demonstration of apparatus. (1) Adaptometer, an apparatus to measure the light sense. (2) A small apparatus for the mixing of spectral colors for use in the laboratory and the clinic. (3) Tables for the investigation of the power to distinguish colors.

Nagel exhibited a small apparatus for the mixture of spectral colors specially adapted for clinical diagnosis, as it furnishes a means for the easy and certain recognition of the different kinds of dichromatic and anomalous trichromatic systems. In addition it can be used to demonstrate the law of color mixing. He also exhibited the new (fourth) edition of his tables for the investigation of the power to distinguish colors, which has been adopted by certain railroads and government departments, and serves for the detection of color blindness and anomalous trichromates. Finally, he showed an instrument called an adaptometer for the quantitative investigation of the light sense.

9. VON HIPPEL (Heidelberg): New experimental teratological condition.

Von Hippel exhibited microscopical preparations of an epibulbar teratoma as large as a hazel nut, containing bone, cartilage, teeth, hair, epidermis, etc., which he had produced by the injection of a triturated head of a twelve-day-old rabbit embryo, preparations which showed lid defects in new-born rabbits after exposure of the mothers to the X-rays, as well

as preparations which showed hemorrhages into the anterior and posterior chambers of such animals.

10. WAGENMANN (Jena): Demonstration of microscopical preparations.

1. A large pediculated polyp in the lachrymal sac. A girl fifteen years old had suffered from inflammation of the lachrymal sac for a year and a half. The sac was extirpated and within it was found a polyp 6mm long, 2 to 3mm broad, and 3mm thick attached to the wall by a broad pedicle. The surface of the polyp was covered by a thin layer of epithelium. The polyp was composed partly of young, partly of old fibrous connective tissue, with a dense network of branching vessels just below the surface. The pedicle sprang from the thickened wall where there was much young granulation tissue. The remaining inflammatory changes of the mucous membrane of the lachrymal sac were slight, though there were many goblet cells. Possibly the polyp had a traumatic origin.

2. A case of tuberculosis of the lachrymal sac. A woman twenty-four years old who had formerly had her face operated on because of tuberculosis of the skin had suffered for several years from disease of the lachrymal sac. Beneath the skin was a thick, pasty swelling from which only a little secretion could be pressed out. The degenerated lachrymal sac was extirpated almost without injury. The wall was greatly thickened on all sides; in the granulation tissue there were numerous nodules with epithelioid cells and giant cells. The mucous membrane was completely submerged in the tuberculous proliferation. The tuberculosis must have taken its origin in the mucous membrane.

11. SEEFELDER (Leipsic): Preparations of a foetal keratitis or kerato-iritis.

Seefelder exhibited preparations of a kerato-iritis in the right eye of an eight months' human foetus, in the left eye of which inflammatory symptoms were demonstrable only on the part of the iris and pupillary membrane, and also of a keratitis in both eyes of a seven months' foetus without positive involvement of the iris and pupillary membrane. He ascribed these conditions to an endogenous infection.

12. HARMS (Tuebingen): Microscopical preparations.

Harms has investigated five more cases of apoplexy of the retina. In three cases he found a closure of the trunk of the central vein by a thrombus, organized and partially canalized, while the arteries remained free. In the other two cases the central artery was almost totally closed by a high degree of endarteritis, while the vein was occluded in one case by primary endophlebitis, in the other by a thrombus.

TUESDAY MORNING, AUGUST 7TH, SECOND SCIENTIFIC SESSION.
DR. UHTHOFF (BRESLAU) PRESIDING.

I. ERDMANN (Rostock): *Experimental glaucoma.*

Erdmann saw the onset of glaucoma after electrolysis of the aqueous of a rabbit, in which a steel needle introduced into the anterior chamber served as the positive pole, which was ascribed to a permanent occlusion of the emunctory channels by the finely granular products of oxydation of the steel which penetrated Fontana's space and set up a cell proliferation. Further experiments brought about the same result in a part of the cases but showed that the electrolytic process undertaken in the anterior chamber was usually followed by severe symptoms of irritation which frequently resulted in phthisis bulbi after a preliminary increase of tension. Therefore, electrolysis was undertaken outside the eye. The aqueous taken from the two eyes of a rabbit was subjected in a sterile vessel to a current of 30-50ma for about two to four minutes with two steel needles serving as electrodes. A portion of the finely flocculent, dark olive green mass which had formed on the positive electrode was then injected into the anterior chamber of another rabbit or into that of the same rabbit whose aqueous had meantime become partly restored. The signs of irritation produced were usually slight, consisting of a little chemosis and injection, a delicate haze of the cornea, and a hyperæmia of the iris. In about 75% of the cases there was added between the second and the fifth days an increase of tension which caused a gradual increase in the size of the eye and excavation of the papillæ. After a week or two, together with the retrogression of the inflammatory symptoms and the clearing up of the cornea, the glaucoma passed into the chronic stage. In such cases the often greatly enlarged eyes, the tension of which remained high for months, with

their clear, more or less insensitive corneæ, usually deep anterior chambers, atrophic irides, and slowly reacting pupils, greatly resembled the human buphthalmos.

2. HOLTII (Christiania): **A new principle of the operative treatment of glaucoma.**

Since 1893 Holth has noticed that the best effects of iridectomies for glaucoma were obtained when the operation was followed by a cystoid cicatrix, the cause of which is always a slight, accidental incarceration of the periphery of the iris in the wound. In these cases the tension remained normal, and good vision was preserved. On the other hand other eyes, frequently better to start with, became again hard and blind in spite of a correctly performed iridectomy.

In August, 1904, after some experiments on rabbits, Holth began to make systematically subconjunctival incarceration of the iris in human glaucomatous eyes. Since March 1905, he has used Schioetz's tonometer to test the tension before and after operation. He tries to exclude the danger of infection by placing the conjunctival incision 10mm from the margin of the cornea. This results in a bleb formation of the conjunctiva which resembles a little œdematosus cushion. Usually a fistula lined with pigment epithelium is formed which reaches into the subconjunctival connective tissue. This fistula he has demonstrated anatomically in one case. But incarceration of the iris can maintain normal tension without the formation of such a fistula, though less surely, perhaps through communication of the uveal and subconjunctival vessels and lymphatics. Holth has performed iridencleisis antiglaucomatosa forty-one times. In eleven cases an iridectomy has been performed previously. In twenty-one cases an iridectomy, and in nine an iridotomy was immediately added.

One case has been under observation too short a time (fourteen days), the rest at least four months. Two cases did badly because the iris drew back into the anterior chamber on the day of the operation. In three cases the tension fell, though not quite to normal. In thirty-five cases, 87 %, permanent normal tension was attained, thirty-one times immediately, in four after a couple of months. As to after-effects Holth has noticed at the end of the first week slight irritation of the iris, though without injurious influence on

tension or vision. Iridectomy is unnecessary for the incarceration; it can be replaced by meridional iridotomies if a coloboma is desired. A small, peripheral, angular iridotomies with incarceration of the flap should leave a round, central pupil.

In the experiments of Bader, 1873, and Herbert, 1903, only the anterior surface of the unwounded iris appears to have been used for the incarceration, while the posterior surface formed a blind sac which did not contribute to the formation of a true fistula. The latter can be formed only by a fold of the posterior surface of the incised iris with the pigment epithelium.

Discussion of Numbers 1 and 2.

SATTLER believes that Erdmann's experiments deal rather with the origin of secondary glaucoma and contribute little to the explanation of the primary form. As regards Holth's method of treatment the demand must continue to remain for an iridectomy performed as exactly as possible.

3. STRAUB (Amsterdam) : The formulæ of anomalies of refraction.

Emmetropia has three qualities: (1) It is determined optically; (2) it is the ideal refraction which Nature tries to reach and maintain. This is the basis of the theory for the full correction of myopia. (3) It is the zero point of our nomenclature of refraction. Therefore it is properly termed the ideal refraction. The author has used the formula $E + nD$ to represent plus refraction, $E - nD$ to represent minus refraction, and $\frac{E+nD}{E-nD} \text{ } 70^\circ \text{ temporal}$ to represent astigmatism for the last five years exclusively and has found that by their means students quickly obtained an understanding of the anomalies of refraction. He recommends them for common use.

4. SCHIRMER (Greifswald) : Prognosis of traumatic abscess of the vitreous.

Schirmer reported the cures he had obtained in traumatic abscesses of the vitreous by the method of large doses of mercury already described by him. Excluding the cases of total panophthalmitis and those of recovery in which the

presence of an abscess was rendered probable by the symptoms though not directly visible on account of the presence of traumatic cataract, he has treated during the past eight years a total of fifty cases in which the abscess was visible as a yellowish or grayish reflex, or has been found on exenteration or enucleation of the eye. Of these fifty cases twenty-four, 48 per cent., did not recover but had to be exenterated or enucleated on account of panophthalmitis, or chronic inflammation. In the remaining 52 per cent. there was perfect recovery from the inflammation, in 36 per cent. with preservation of vision. In twenty-two abscesses which contained foreign bodies, the percentage of recovery was 59 per cent., which is to be ascribed to the insignificance of the mechanical injury. The foreign bodies were always removed as soon as possible. Unsatisfactory function at the time of entrance does not always exclude the hope of a restoration of good vision, the trouble is frequently only a toxic paralysis of the nervous elements of the retina.

The author has instituted a long-continued, conservative treatment in 157 infected eyes after perforating wounds during the past ten years. In spite of the fact that among these there were certainly many inclined to sympathy he has never observed a case of sympathetic inflammation during the mercurial treatment, nor within three months after its discontinuance. He therefore concludes that mercury exerts a prophylactic action against sympathetic ophthalmia, and considers this method preferable to the injection of iodoform. The fear of sympathetic inflammation has always been the chief obstacle to an adequate, long-continued treatment.

Discussion of Numbers 3 and 4.

SCHMIDT-RIMPLER has used the mercurial treatment many times in injuries, but warned against trusting to this method too implicitly because in many cases enucleation is finally necessary. He is accustomed to use it also in choroiditis disseminata and recommended intramuscular injections.

KRUECKMANN questioned whether the catalysis, which is promoted in inflammation by the presence of alkaloids, does not play a part in the favorable action of mercury in these

cases, so that eventually the result may be obtained with very small doses of mercury.

SCHREIBER emphasized the difference which is found sometimes in abscess of the vitreous between the very advanced clinical picture and the relatively slight anatomical infiltration of the vitreous, and ascribed the early loss of vision to the action on the retina of a toxin which produced changes in the ganglion cells demonstrable with Nissl's stain.

MAYWEG uses inunctions of 8 grammes per day.

LANDOLT prefers intravenous injections.

ROEMER asked what bacterial kinds of vitreous abscesses were so favorably influenced by mercury, because certain infection producers tend to spontaneous recovery.

SCHIRMER responded that small doses of mercury had not proved practicable. Bacteriological investigations had not been made, but experience teaches that vitreous abscesses in man do not usually heal spontaneously.

5. WESSELY (Berlin): The action of Bier's stasis on the eye in experiments on animals.

Wessely employed for his experiments rabbits which bear stasis in the head very well, even when it is sufficient to produce a marked œdema. Exophthalmos and chemosis of the conjunctiva were produced, but no hyperæmia of the internal vessels could be demonstrated, and in particular there was no increase of the albumin-fluorescin excretion from the iris and ciliary processes which always accompanies internal hyperæmia of the eye. Application of the suction bell, suggested recently by Hesse, produced greater protrusion of the eye and chemosis, the ocular tension increased enormously, but soon gave way to a softening of the globe, and with the highest degree of suction the excretion of albumin and fluorescin in the eye was increased, though in less degree than after puncture of the anterior chamber, or subconjunctival injections of salt solution. The value of both procedures must naturally be determined by clinical experience, but Wessely believes that it has been shown by his experiments that their use will be limited, and that the harmless methods employed to obtain local hyperæmia will retain their pre-eminence in ophthalmology.

Discussion of Number 5.

SCHIRMER has observed a great increase of tension produced in rabbits by the experimental use of Bier's method, together with a little excretion of albumin and haemolysin in the aqueous.

HALBEN has used the suction stasis on men and obtained a lowered tension.

NIEDEN saw a marked swelling of the retinal veins after the application of the stasis bandage to men.

AUGSTEIN believes after an experience of thirty cases that the stasis affects the inner parts of the eye. He has seen a good result in only three cases of panophthalmitis.

MAYWEG saw encouraging results in five cases of injury.

BAIRR and HUMMELSHIEIM have been unable to satisfy themselves that they obtained benefit by this method, and the latter could not detect any stasis of the retinal veins.

WESSELY said in conclusion that Schirmer's result might be ascribed to the greater or less exophthalmos and the drying of the cornea thus caused. The great increase of tension in suction stasis was proven by him by manometric measurements during the suction. He considered that the principal result of his experiments was to show that the stasis produced within the eye remarkably little effect in the way of hyperæmia as compared with its very marked effect elsewhere.

6. ONODI (Budapest): The etiology of the contralateral disturbances of vision and blindness of nasal origin.

Onodi has ascertained by anatomical demonstration that the partition between the posterior ethmoid cells, the sphenoid sinus, and the optic canal is very thin and that frequently the optic nerve runs directly through one of these cavities. He distinguishes eleven groups with thirty-four possibilities of these conditions. A case was observed in which blindness of the left eye followed Killian's frontal sinus operation on the right side. Nothing like it has been observed before, and the author is of the opinion that it was caused by an indirect fracture of the optic canal on the opposite side. He describes also cases of contralateral disturbance of vision from monolateral empyema of the accessory sinuses

which are explained by the variable anatomic conditions of these cavities. The possibility of disease of the accessory sinuses should therefore always be considered in unexplainable disturbances of vision.

7. GRUNERT (Bremen): *Thiosinamin in ophthalmology.*

Grunert reported the results he had obtained with thiosinamin in cutaneous scars of lupus and in postneuritic optic atrophy. He used Juliusburg's mixture, thiosinamin 4.0; glycerine 8.0; distilled water to make 40.0.

In postneuritic atrophy he adds to this solution 0.2 of strychnine nitrate. This solution he injects into the muscles, usually of the arm, beginning with about 1ccm daily and gradually increasing the intervals. The thiosinamin makes scars softer, more movable, and looser, and gradually causes them to become smaller. The addition of strychnine is used only in the first part of the treatment. When no further improvement can be obtained this condition is to be maintained by the use of the pure solution of thiosinamin. Too early cessation of the treatment always results disastrously. No benefit was obtained in four cases out of thirteen of indubitable postneuritic atrophy. One of these belonged to the rare group of family atrophy, the other three were cases of absolute amaurosis which had existed a short time. In nine cases a notable improvement was obtained. As the physiological action of thiosinamin is to produce hyperæmia and lymph stasis there are certain contra-indications to its use, for example, detachment of the retina, vitreous opacities, and fresh inflammations of either eye. Thiosinamin can also readily excite an acute pathological condition in other parts of the body, or start up an old latent focus. This renders care necessary in its use.

Discussion of Numbers 6 and 7.

SCHMEICHLER has used thiosinamin with an absolutely negative result in two cases of corneal opacities.

NIEDEN has seen gangrene result from the use of thiosinamin in a case of ectropium and warns against its injection near dense scars.

FUCNS asked in what stage the cases of postneuritic atrophy were.

UHTHOFF has always seen negative results in trachoma scars and objected to Grunert's statistics that he made no distinction between the slight monolateral forms of neuritis in women and the serious bilateral forms.

GRUNERT said in reply that the cases were those in which the disease had run its course and that he considered it dangerous in fresh cases on account of an increase of the inflammatory swelling of the tissue.

8. LEVINSOHN (Berlin) : Experimental contribution to the pathogenesis of choked disk.

In order to ascertain the direction of the movement of fluid in the vaginal space of the optic nerve the writer ligated the optic nerves of a series of cats and rabbits and then sought to demonstrate in how far the signs of stasis were present. In a number of animals also a small quantity of fluid containing cinnabar was injected into the subarachnoid space in the brain and the presence of the coloring matter in the optic nerve and eye determined by a series of sections a shorter or longer time after the injection into the brain. Finally the optic nerves were ligated and the injections of cinnabar made at the same time. His conclusions were as follows:

1. There is a slight current of the cerebro-spinal lymph from the brain through the vaginal space of the optic nerve, and another from the eye to the optic nerve along the axial cord. Both currents escape from the optic nerve through the perivascular spaces of the central vessels.

2. An injection of cinnabar into the subarachnoidal space at the vertex of the skull, made with only a little pressure, almost immediately fills the entire vaginal space of the optic nerve and even penetrates into the perivascular spaces of the central vessels.

3. A stasis in the proximal section of the optic nerve, which shows itself particularly in the onset of a hydrops vaginae, acts very strongly in opposition to inflammatory symptoms in the optic-nerve sheath.

4. The production of choked disk is due to the combined action of three factors, of which two are primary, intracranial pressure and inflammatory changes of the cerebro-spinal lymph, and one secondary, stasis of the papilla through

obstruction to the escape of the vitreous lymph, and to these are very soon added symptoms of inflammation.

9. DIMMER (Graz) : The macula lutea of the human retina.

It is well known that Gullstrand has shown by ophthalmoscopic, entoptic, and anatomic investigations that the yellow coloring of the fovea is a post-mortem phenomenon. Dimmer has now repeatedly seen the yellow color in embolism of the central artery when examined by daylight. In the photograph of such a case the yellow spot was plainly visible as a dark spot. If the pupil is dilated and very strong daylight is used, the yellow spot can be seen very beautifully in a darkly pigmented normal eye. It extends over an area of $\frac{1}{4}$ the diameter of the papilla, sometimes even more, and thus corresponds to the fovea, the thinnest place in the retina, and its immediate neighborhood. The macula is best seen in young people. These investigations prove that the macula lutea is present in the living eye. The entoptic appearance of Maxwell's spot is to be ascribed to the absorption in the yellow pigment, and agrees in its proportionate size with the ophthalmoscopically visible macula lutea. The paradoxical entoptic appearances described by Gullstrand prove nothing against the existence of the macula lutea. The polarization bundles of Haidinger are to be explained as by Dimmer in 1894. The old measurements, which do not agree with the entoptic appearances, were made anatomically and were due to the fact, which Dimmer could prove, that in the cadaver the coloring matter diffuses into the surrounding retina.

Discussion.

GULLSTRAND cannot agree with Dimmer. In the first place, it is a contradiction that the yellow color should be made visible simply by a greater intensity of the same light. This would rather indicate that the color was due to reflected light from the pigment epithelium. Second, Dimmer's yellow spot is much smaller than that found in the dead body. Third, the appearance of the fovea in blue and green spectral light gainsays the existence of a yellow color.

SCHMIDT-RIMPLER protests that a just enucleated eye

should not be denominated cadaveric. It should rather be considered as surviving (*ueberlebend*), and in this is at first to be seen a brown spot which is also much larger than Dimmer's.

VON MICHEL has examined the eye of an executed criminal ten minutes after death and found that the yellow spot first appeared after the lapse of an hour.

DIMMER replied to Gullstrand that the darker the pigment epithelium the better the yellow spot could be seen ophthalmoscopically. The greater size of the brown spot seen by Schmidt-Rimpler depended on the behavior of the pigment epithelium in the fovea.

TUESDAY AFTERNOON, AUGUST 7th, SECOND DEMONSTRATION SESSION. DR. VON HIPPEL (HEIDELBERG) PRESIDING.

1. ERDMANN (Rostock): Demonstration to illustrate his paper.

2. TH. LEBER (Heidelberg): Observations in regard to conjunctivitis petrificans.

Leber has proved in a patient with conjunctivitis petrificans that the destroyed tissue as well as the conjunctival fluid has an acid reaction dependent on the presence of free sulphuric acid. Treatment is limited to cleansing and dusting in calcined magnesia.

15. REIS (Bonn): Microscopic preparations of congenital annular parenchymatous keratitis.

Reis demonstrated preparations, microphotograms, and diapositives of the two eyes of a child born in the eighth month of pregnancy, which died soon after birth from congenital syphilis, proved by the presence of spirochaetae in the internal organs. Both eyes presented a broad, regular annular opacity of the cornea of a grayish-white or yellowish color, running concentrically to the limbus. The microscope showed a complete absence of the epithelium of the cornea except for a single layer of smooth cells (regenerated epithelium) which formed a narrow marginal zone. Bowman's membrane was perfectly preserved and the most superficial layers of the corneal parenchyma were comparatively little changed. Somewhat deeper there were a great number of

wandering cells and an increase of the fixed corneal corpuscles, changes which disappeared farther back, so that the posterior third of the corneal parenchyma seemed as good as intact. Descemet's membrane, together with its endothelium, was unchanged. The histological substratum of the true annular opacity consisted of: (1) profuse infiltration of leucocytes, (2) an extensive proliferation of the fixed corneal corpuscles, (3) an abundant destruction of nuclei, and (4) isolated microscopic ally small necroses of the corneal tissue. There was no trace of vessel formation in the cornea. In the anterior portion of the uveal tract there was a moderately severe exudative inflammation, with an exudate of fibrin and cells from the vessels of the iris and of the persistent pupillary membrane, deposits on the posterior wall of the cornea, little accumulations of leucocytes in the angle of the anterior chamber, and a cellular infiltration of the ciliary muscle. Spirochætæ were not found in the cornea, but they may perhaps have been driven out by the severe tissue reaction in the cornea, because they could not be demonstrated in the tissues and organs of the body which had been most seriously changed. Finally, the influence of the syphilis toxin alone is to be considered. This case renders certain the occurrence of an intra-uterine parenchymatous keratitis and renders very probable the ectogenous origin of a foetal parenchymatous annular keratitis in a syphilitic foetus as an injurious influence on the part of the liquor amnii upon the surface of the cornea.

4. GREEFF and CLAUSEN (Berlin) : Spirochætæ in experimental interstitial keratitis.

If the eye of an ape or of a rabbit is infected with syphilitic material an opacity appears after some weeks which begins at the margin of the cornea, runs interstitially, and extends tonguelike into the cornea. Spirochætæ are found in the opacity, but still more in the still transparent cornea. As soon as the opacity has become interstitial the spirochætæ disappear. The leucocytes appear first to cause the opacity of the cornea and then gradually to destroy the spirochætæ.

5. ROEMER (Wuerzburg) : Experimental intraocular infection with protozoa.

Ophthalmology must begin to busy itself with the recently

found protozoa, because the excitors of eye diseases the etiology of which is unknown may well be found among the protozoa, and because since the discovery of the spirochætæ of syphilis by Schaudin syphilitic diseases of the eye may be taken in hand experimentally. Roemer finds that trypanosomata find their way into the circulation after intraocular inoculation. Further he has proved that trypanosomata in the blood produce serious inflammation within the eye. This is an experimental confirmation of the observations in Africa of eye symptoms in patients suffering from trypanosoma disease. This way of infection deserves notice in the pathogenesis of the sleeping sickness, the connection of which with trypanosoma has been proven. Roemer has made further experiments with a stock of spirochætæ which he propagated in a canary bird. This experiment is not yet concluded and the question is whether the stock will be in condition to produce an interstitial keratitis in the cornea of an animal. These spirochætæ were demonstrated.

6. STARGARDT (Kiel): Protozoa in the eye.

Stargardt has investigated experimentally the question whether protozoa can produce eye diseases. In animals suffering from a general infection of trypanosoma, a protozoön belonging to the class of flagellates, diseases of the eye were frequently observed, but the proof was not obtained from stained sections that the trypanosoma was really the cause. He experimented on 60 mice, 25 guinea-pigs, and 12 rabbits with the trypanosoma Evansi, which causes the so-called surra in horses, camels, and other animals in India. All the animals were killed by the infection. He did not observe any spontaneous diseases of the eyeball. Retinal emboli could not be detected with the ophthalmoscope, although cerebral emboli were frequently met with. In guinea-pigs and rabbits there was always a high degree of conjunctivitis due to numberless trypanosomata in the conjunctiva which multiply here abundantly. Infection through the intact conjunctiva also took place after cauterization of the canaliculi. The trypanosomata remain in the anterior chamber one or two days after inoculation, but cause little or no inflammation. Uveitis follows injection into the vitreous. The parasites were always

found in the diseased tissue and also in the cornea in parenchymatous keratitis. In the rabbits they were only few because of the lively phagocytosis.

Discussion.

LEBER, Jr., has also investigated the action of trypanosomata in the eye and has seen general infection originate from the eye. He has also obtained a parenchymatous keratitis with dead excitors of the sleeping sickness, so the endotoxin must be efficient.

7. GREEFF (Berlin): *Ophthalmology of Rembrandt.*
8. FLEISCHER (Tuebingen): Demonstration illustrative of his paper.

9. WOLFRUM (Leipsic): *The genesis of the vitreous.*

Wolfrum exhibited preparations which showed the embryonal development of the vitreous in pigs, rabbits, sheep, white rats, and in the human embryo, from which he concludes that the vitreous is a purely ectodermal formation coming only from the retina. He agrees with Koelliker in making a distinction between a primary and a permanent vitreous. The primary vitreous is formed from protoplasmic outshoots which arise originally from the lens and retina but later from the retina alone, and fills the entire space between the lens and the retina. Coincidently with the appearance of the vessels, but independently of them, a concentric constriction of radiating fibres is formed parallel to the inner surface of the retina. This system of fibres, together with the mass of fibres coming from the margin of the covering of the secondary optic vesicle and belonging later to the pars ciliaris retinæ, forms the first foundation of the permanent vitreous.

10. SALZER (Munich): *Anatomical studies of the eye disease caused in trout by parasitic worms.*

The larvæ of the trematoda enter the eye by way of the blood or lymph and penetrate the lens capsule by means of their tissue-softening fluids. They remain, as shown in the preparations, in the cortical substance just beneath the capsule. The cortical substance presents peculiar clefts and fissures which usually radiate and may reach into the nucleus. They contain parasites or only granular and filamentous

masses. So long as the lenticular capsule is comparatively intact no noteworthy reaction occurs in the other parts of the eye. The places where the worms have entered are closed by formations which resemble secondary cataract. When, through destruction of the capsule, the masses of worms and the products of destruction of the cortex escape into the anterior part of the globe, they occasion a severe iritis as well as a purulent ulcer of the cornea, which goes on to perforation and allows the escape of the remains of the lens mixed with part of the worms. The author rejects the doubt raised as to the correctness of Nordmann's observations in regard to the occurrence of the larvæ of the trematodæ in the human lens: because it was impossible that he could have been deceived by contamination of his preparations. He conjectures that such cases in men are very easily overlooked, because the life of the parasites in the lens is certainly limited, perhaps is very short, and fresh cases do not come to operation or investigation as the opacity of the lens at first is slight, and after the worms are dead they can be recognized only with great difficulty if at all, as shown by the preparations. As the larvæ are $\frac{1}{2} \text{ mm}$ in size they may be seen with the naked eye, but certainly with the loupe or Zeiss's microscope. It is recommended therefore to bear the possibility of this affection in mind in the examination of certain cases of punctate cataract, as well as of cataract preceded by inflammation. The infection may come to man as to the fishes through water-containing eggs of the intestinal parasites of water birds.

11. WINTERSTEINER (Vienna): *Idiopathic pigment cysts of the iris.*

Wintersteiner exhibited pictures of a multilocular cystic tumor of the posterior surface of the iris of a man twenty years old. The clinical picture had been that of a solid malignant tumor which indicated enucleation. Transillumination would certainly have corrected the diagnosis, but enucleation would have finally been necessary because in view of the multilocular formation of the cyst puncture would not have succeeded in reducing the increased tension.

12. UHTHOFF (Breslau): *Fundus picture of a case of so-called polycythaemia.*

The patient presented the rare symptom complex of poly-

cythaemia, marked cyanosis of the face and extremities, great increase of the red blood corpuscles 11-13,000,000, great increase of hemoglobin, albuminuria, enlargement of the spleen, neurasthenia, etc. The disease was at first described by French authors in 1890, and about thirty cases have been recorded.

The ophthalmoscopic picture was characterized by a great dilatation and a dark color of the retinal veins. The dilatation was not uniform, but there were varicose swellings of the venous trunks. The arteries were somewhat fuller and darker than normal. The picture was recognizable as pathological at the first glance and retrograded somewhat with the improvement of the general condition. There was no disturbance of vision. Great relief was afforded the patient by occasionally repeated venesections. No retinal hemorrhages were present.

In some cases no pathological fundus condition has been noticed, in others a venous hyperæmia has been mentioned, as in Koester's case, in which there were periodic obscurations of the field of vision which persisted for several hours, did not affect the two eyes equally, and were thus plainly of peripheral origin.

13. BERNHEIMER (Innsbruck): Congenital anophthalmos and the visual tract.

The methods hitherto employed by the author and others have contributed much to the investigation of the visual tracts, but in important particulars there is yet no unity of opinion. The author has undertaken to solve disputed points by anatomical examination of brains of animals with congenital monolateral anophthalmos, or monolateral absence of the optic nerve, and by experiments upon them. In this paper the anatomical conditions of four brains of rats with congenital absence of the right or left optic nerve are dealt with; the experimental results are reserved for another paper.

The courses of the decussating and non-decussating optic fibres are naturally well separated through the entire optic tract to the nuclei near the commissural fibres. One obtains a clear insight into the relative position and number of both kinds of fibres. Contrary to the assertion of Cajal the sections show that in the rodents, at least the rats, there is a considerable number of non-decussating fibres, corresponding to the

position of the eyes and the small common visual field. As the common visual field is enlarged in animals, the number of the non-decussating fibres increases. In man, therefore, the disproportion, even though present, should be extremely small.

The demonstration of a kind of inward radiation in the external corpus geniculatum is important. It confirms the claim previously made by the author, that the decussating and non-decussating fibres radiate into the external corpus geniculatum closely mixed together and involve all parts alike, both the stratum zonale and the cortical substance. A geometrical projection of the retina by the internal mixture of all sorts of fibres in the corpus geniculatum is improbable.

The well-known view of the author in regard to the junction of the optic fibres to the cerebral cortex received confirmation.

14. WESSELY (Berlin): A new method for the graphic registration of ocular tension and some of the results obtained with it.

The principle of any exact manometer of the eye depends on such a regulation of the mercury during the entire course of the experiment as will prevent a loss or increase of fluid in the eye. This purpose has not been accomplished perfectly in the methods hitherto employed for the graphic delineation of the ocular tension, so the author has constructed a very small Marey's capsule, in connection with a regulatable mercury manometer which records the slightest change in the tension by means of a very delicate lever mechanism without the use of the fluid under consideration. In this way he has been able to delineate very accurate curves of the ocular tension for hours, which show fluctuations dependent on the pulse and respiration. Curves were exhibited which showed the parallelism between the fluctuations of the blood and of the eye, the varying action of intravenous injections of adrenalin according to the predominance of one or other of certain factors, and finally the great, though transient, increase of intraocular tension after subconjunctival injections of salt solutions.

WEDNESDAY MORNING, AUGUST 8TH, THIRD SCIENTIFIC SESSION.

DR. HESSBERG PRESIDING.

1. BEST (Dresden): The pathogenesis of retinal detachment.

Repeated subcutaneous injections of phloridizin produce in rabbits, in addition to other symptoms, an exudate between the retina and the pigment epithelium. An exudate may also be produced by the subconjunctival injection of irritating substances, by circumscribed cauterizations of the sclera, and frequently by intraocular bacterial inflammations. Most retinal detachments with any form of chronic iridocyclitis, diabetic and probably albuminuric retinitis are produced, in the opinion of the author, by exudation. The cause of spontaneous detachment he believes to be the constantly recurring traction of the vitreous, rendered uneven by partial fluidity and circumscribed condensations, upon the retina during the movements of the eyes, rather than traction due to shrinking. The traction of the vitreous causes lacerations of the retina only in places where it has become atrophied from age or other processes.

Discussion.

VON HIPPEL spoke of a case of sympathetic ophthalmia in which an extensive detachment appeared in each eye. The anatomical examination of the first eye revealed that the trouble was a purely exudative post-retinal process without involvement of the vitreous. The detachment in the other eye recurred. But such cases are of no value in regard to the cause of spontaneous detachment.

UHTHOFF insisted that artificially produced detachments could not greatly further our knowledge of the pathogenesis.

2. UHTHOFF (Breslau): **Metastatic carcinoma of the choroid.**

Uhthoff reported the third case he had found on autopsy of bilateral metastatic carcinoma of the choroid from cancer of the breast. Besides these he had at his command two cases of metastatic carcinoma of the ciliary body, one Paul's case, the other published by himself. The present case presented a number of notable peculiarities.

First, the development of the metastatic carcinoma of the choroid from single metastatic foci in the left eye of a patient fifty-four years old was observed ophthalmoscopically for three months, and demonstrated by ophthalmoscopic drawings.

The anatomical investigation in the region of the ciliary body in each eye showed a single small carcinoma nodule which he took to be of metastatic origin and not due to dissemination. In the second place there was a large, sharply defined necrosis through the entire thickness of the extensive, thin tumor in the left eye, which was evidently due to a hemorrhagic infarct. Third there was a spontaneous replacement of the detached retina in the right eye with improvement of vision, while the choroid was stained yellowish red with numerous patches of pigment.

In each eye the tumor was superficial and scale-like as is usual in metastatic carcinomata, but in the left eye the formation of the tumor from several confluent foci could still be recognized on section.

There were numerous metastases in other parts of the body.

3. TH. LEBER (Heidelberg) : Very high hypermetropia with the lens present.

The author finds that these cases are not so very rare. He has met with sixteen cases of hypermetropia between 8 and 16 dioptries. In two cases it was hereditary. In all the vision was subnormal. With Javal's ophthalmometer he has found the radius of curvature of the cornea to be always smaller than in emmetropic eyes, even down to 6mm. This great curvature of the cornea must cause a myopia, the value of which the author has worked out for each case. The shortening of the eye in the cases of high hypermetropia is thus still greater than is indicated by the number of dioptries. This shortening is not only sagittal, but the entire eye is reduced in size so that it might be called a slight degree of microphthalmos. Accurate measurements of such eyes when they shall happen to be met with at autopsy are very desirable, and the author asks for attention to such cases. The reason that the small eye of the infant does not exhibit great hypermetropia is that the lens has a greater curvature, as has been shown by measurements.

Discussion of Numbers 2 and 3.

LANDOLT spoke of a case of 20 dioptries of hypermetropia, mentioned in Donders's text-book, which he had afterwards

treated for bilateral irido-choroiditis. He thought it possible that this was a revival of the same process which during intra-uterine life had caused the eye to remain small.

SATTLER had found the corneal radius normal in many such cases and considered measurements with Helmholtz's instrument to be more accurate.

HERTEL and BEST had on the contrary always found the radius small.

GRUNERT remarked that in spite of the smallness of the eyes the orbits were of normal dimensions in such cases.

HIRSCHBERG had observed a case of microphthalmos from the third to the eleventh year and found a markedly rapid development of the breadth and radius of the cornea beyond the normal. He was of the opinion that the radius of curvature plays no part in myopia, though it certainly does in hypermetropia.

FLEISCHER had found a great flattening of the cornea and lens.

LEBER confirmed Grunert's statement. He considered Helmholtz's instrument more accurate than Javal's, but he had made careful observations and would answer for the correctness of his statements.

4. ZUR NEDDEN (Bonn): The therapeutic and diagnostic value of early puncture of the anterior chamber in iritis.

The transference of iris tissue and aqueous from men with tuberculous iritis to the eyes of rabbits is successful only when the material is obtained in the early stage of iritis, because after the disease has lasted some time the germs are no longer able to produce the pathological process on the animals used for experiment. This is shown by experiments instituted by zur Nedden in several cases. It is difficult to obtain iris tissue in a commencing iritis because iridectomy is usually called for only after the onset of severe symptoms, but a paracentesis may be easily performed in the earliest stage of an iritis without injury to the eye. Experiments in acute endogenous iritis in rabbits showed that the early paracentesis exerted a very favorable influence over the disease, which is to be explained by the renovation of the aqueous and the hyperæmia caused by the operation, which according to Bier's

discovery must be regarded as the most suitable means of cure in infectious processes.

Several cases of iritis in human eyes recovered quickly when paracentesis was performed at the beginning and repeated several times in the course of a week.

Besides the inoculation of the aqueous it was recommended that it should be examined on slides, stained in various ways. In this way a few spirochætae, probably identical with the spirochæta pallida, were found in the aqueous in one case of syphilitic iritis.

The knowledge of the etiology of iritis will be forwarded if in acute cases the blood be examined bacteriologically at the same time with the aqueous.

Discussion.

STOCK has injected the aqueous from eyes with tuberculous iritis into rabbits' eyes with negative results. He considers the injection of tuberculi TR as the most certain means of diagnosis at the present time. He suggests against paracentesis that tubercle bacilli might be freed from the vessels.

FUCHS has occasionally performed paracentesis in iritis and obtained one favorable among many negative results, but has never seen harm occasioned by it.

VON HIPPEL spoke of a case which showed that even on anatomic examination the diagnosis of tuberculosis may sometimes be difficult.

WOLPRUM has found tuberculin to be not always a certain means of diagnosis.

CLAUSEN remarked that the demonstration of the spirochætae in the aqueous had not previously been obtained.

WESSELY stated that he had been able by repeated punctures of the anterior chamber to draw the serum constituents into the vitreous.

NEDDEN in conclusion asserted that the danger from paracentesis is very slight.

5. BIELSCHOWSKY (Leipsic) : Disturbances of absolute localization.

Bielschowsky has investigated the disturbance of absolute

localization, faulty projection of the visual field, in twenty-five paralyses of the ocular muscles, and has come to the following conclusions:

1. In typical cases the fault of localization during fixation of the paralyzed eye almost always approaches the size of the secondary angle of strabismus.

2. A typical case whose most essential characteristics, dependence of the size of the angle of strabismus on the line of vision and alternating fixation, have been lost, frequently shows when one or the other eye is fixed, correct localization, or a fault corresponding to the angle of strabismus, a condition which renders possible the differential diagnosis between such atypical forms of isolated paresis and disturbances of the opposing innervation.

3. The spastic disturbance of localization first described by Sachs is met with not in all but in occasional cases during vision with the non-paralyzed eye, not only with constant secondary deviation of the paralyzed eye, but also in the common cases in which the sound eye governs. In the case of a paresis of the right abducens during fixation with the left eye the spastic localization appears to the left of the object of fixation, yet only, or at least most markedly, in the region of the internal rectus. No satisfactory explanation of this spastic disturbance has yet been suggested.

Discussion.

LANDOLT thinks that the difference between the primary and secondary angle of strabismus corresponds about to the degree of false projection. This opinion is based not on theoretical grounds but on practical experience with fresh cases of paretic squint.

BIELSCHIOWSKY replied that in cases in which the difference between the primary and secondary angle of strabismus quickly disappeared the false localization still corresponded to the angle of strabismus.

6. FLEISCHER (Tuebingen): *Microphthalmos.*

The author has examined the eyes of a human miscarriage and three pairs of microphthalmic eyes of dogs. The first presented remarkable conditions. The eye was divided into

an outer and an inner portion by a septum of retinal tissue, which proved to be a duplication of the innermost layers of the retina. Below, the septum merged in the mesoderm that filled the choroidal coloboma. In the lower part of the globe a mass of atypical retinal tissue extended like a septum from the papilla to the posterior surface of the lens. The iris, particularly its retinal constituents, was bent about the equator of the lens and adherent to its posterior surface, or to the contiguous tunica vasculosa lentis. The author ascribes special significance to these adherences in regard to the origin of the malformation, and refers to similar cases, particularly that of de Vries. He believes that these adhesions between the mesoderm and its vessels and the retina and lens have a signification also in simple coloboma as claimed by Bach. Whether the cause is to be found in the mesoderm or in the ectodermal formations he leaves undecided. He recommends that in the future particular attention be paid to these conditions.

7. LOHMANN (Munich): *Adaptation to light.*

Lohmann exhibited curves illustrative of the course of adaptation to light.

While the decrease of sensibility of the eye to slight stimulation is sudden during the first third or the first minute of the transition from good adaptation to the dark, to that for light it is slower during the following minutes. Even after half an hour adaptation to light is not perfect. As the course of the adaptation to light is more rapid at first, the curves were not obtained from observation of the adaptation process, but were the result of a fractional determination. Curves for different degrees of light were shown which, though of the same general character, presented different levels in their final courses and thus determined that the question was not with regard to a light adaptation, but to light adaptations. To determine the necessary amount of stimulus, he employed first an apparatus constructed by himself, and in a second series of experiments Nagel's adaptometer.

8. HARMS (Tuebingen): *Etiology of momentary obscurations in choked disk.*

Harms had the opportunity to examine ophthalmoscopically

a patient with double choked disk during a sudden attack of blindness of the left eye. The patient was a woman forty years of age. The left optic disk was swollen between 3 and 4 dioptres, the right 3 dioptres. For three years she had suffered from pain in the left side of the head, and three weeks before she had had an attack of paralysis of the right arm which disappeared spontaneously at the end of a week. For the past fourteen days she had from time to time sudden obscurations of the left eye. Ophthalmoscopic examination during such an attack showed that the cause was a total anaemia of the retinal arteries while the fulness of the veins remained unchanged. After some minutes there was a slow restoration of the retinal circulation with improvement of the vision to its former point. This was observed with the ophthalmoscope a second time five days later. Cerebral focal symptoms were not neurologically demonstrated as the cause of the choked disks; on the contrary, acute parenchymatous nephritis was present. There were no signs of albuminuric retinitis.

HARMS ascribes the interruption of the circulation to a spasm of the arteries. The observation proves that JACKSON's explanation of the transient obscurations in choked disk as epileptiform amaurosis from cerebral cause is incorrect, at least in a part of the cases.

Discussion.

WAGENMANN pointed out that a distinction must be made between monolateral and bilateral attacks, because while in the latter the explanation must be referred to the central organ, in the former the cause may be a vascular spasm.

HIRSCHBERG agreed with Wagenmann. Harms's case was not one of typical obscuration in choked disk, for this is bilateral and both fields are uniformly contracted from the periphery toward the centre.

LEBER mentioned a case in which the attacks numbered 100 in one day. There were no symptoms of increased brain pressure and the explanation was referred to vascular spasm.

FUCHS inquired whether in Harms's case the obscuration coincided in time with the objective condition of vascular spasm.

VON MICHEL was of the opinion that Harms's case was not one of true choked disk, but one of papillitis from contracted kidney, general arteriosclerosis, and myocarditis. Similar vascular spasms occur not infrequently in endarteritis proliferans.

HARMS replied that the obscuration was coincident with the objective condition, and considered a bilateral vascular spasm possible with disease of the vessels.

9. WESSELY (Berlin): The action of some of therapeutic measures most employed on artificially produced retinal detachment.

Wessely had tested the effect of the pressure bandage and of subconjunctival injections of salt solution, particularly applied to detachments produced by cauterization. The experiments were rendered very difficult by the spontaneously varying courses and the rapid absorption of the artificial detachments, but he was able to demonstrate that the bandage had no marked influence over the process of reattachment. Injections of salt solutions did not hasten the resorption of the post-retinal exudate, but rather prolonged the exudate process. He expressed great reserve with regard to the application of these results to human pathology.

Discussion.

SALZER and SCHMEICHLER spoke of cases in which in spite of violent shaking of the head a detachment of the retina became replaced or remained replaced. Their conclusion was that the result was due to rest and pressure bandage.

UITHOFF asked whether after reposition of the artificial detachment there were signs of reaction on the part of the choroid which were ophthalmoscopically visible.

WESSELY replied that the cauterized place usually became visible later as a large pigmented spot.

Dr. LEBER closed the meeting.

REPORT OF MEETING OF THE OPHTHALMO-
LOGICAL SECTION OF THE NEW YORK
ACADEMY OF MEDICINE.

BY DR. H. W. WOOTTON, SECRETARY.

MONDAY, JANUARY 21, 1907. PRESIDENT, DR. J. H. CLAIBORNE,
IN THE CHAIR.

Dr. E. B. COBURN presented a specimen of microcephalic, monocular, octo-digital, octo-dactyl, unirenal, asexual monster. This monster weighs $2\frac{1}{4}$ lbs., is $14\frac{1}{2}$ inches long, and lived three days, five hours. The head is microcephalic and the fontanelles are closed and the bones (cranial) well ossified. Palpation and inspection show that the left eye is absent and not even a nodule can be felt in the orbit. The left palpebral fissure measures 14mm and the right 17mm. There are four fingers on each hand and four toes on each foot with no sign or stump of a fifth. There is only one kidney, and in the pelvis can be found no trace of any kind of sexual organs. During life, there was a slight swelling externally which might have been undeveloped labia majora or scrotum. The monster became infected after death with bacillus aërogenes which caused enormous enlargement of this swelling, causing it to look very much like a scrotum but with no testes. The urethra opened at the anus. X-ray examination showed the left orbit to be smaller than the right and nearer the median line.

Dr. THOS. R. POOLEY presented a case of redundant skin of the upper lid.

The patient, a young woman of seventeen, showed a disfigurement caused by the covering of the fold of the upper lid being of unusual size, so as to hang down over the free border

of the lid in the region of the palpebral fissure. This condition, which constitutes the so-called ptosis adiposa of Sichel, was formerly supposed to be due to an excess of adipose tissue in the skin covering the lid. The term, however, is a misnomer. Its true cause depends upon the fact that the bands of fascia connecting the skin with the tendon of the levator palpebræ superioris and with the upper and outer margin of the orbit are not rigid enough; consequently, the skin is not properly drawn up when the lid is raised, but hangs down in the form of a pouch. The disfigurement caused is the only trouble, and this can be relieved (as I have done in several cases) by removal of the excess of skin, or by Hotz's operation, which consists in attaching the skin to the upper border of the tarsus. The eyes were otherwise normal except that there were H. D. and opaque nerve fibres in the left; V - $\frac{2}{10}$.

Dr. E. L. OATMAN read a paper, illustrated by lantern slides, on inclusion cysts of the conjunctiva. These cysts develop from conjunctival epithelium which has been excluded from communication with the surface either by adhesive occlusion at the mouth of a conjunctival crypt or by approximation and agglutination of conjunctival folds. Conjunctival cysts have been observed with comparative frequency since the introduction of the expression operation for trachoma. The specimen exhibited followed this operation. The walls of the cyst were made up of loose fibrous tissue covered externally and lined internally by epithelial cells of conjunctival origin. The cells which covered the external or conjunctival surface were young and actively proliferating. The cells which lined the cyst were histologically identical with those on the outer surface, but differed from them in that they were older, fewer in numbers, and less coherent. The cyst contents were composed of a slightly albuminous fluid, degenerated epithelium, and cellular detritus.

The mechanism by which these cysts were formed undoubtedly varies, but the essential feature is the segregation of some cells from the surface epithelium by inclusion in the substantia propria. This is brought about by special conditions, an ideal one being the operation of trachoma expression. The traumatic conjunctivitis which follows this operation differs

anatomically from the conjunctivitis of infection. The squeezing and stripping to which the conjunctiva is subjected during mechanical removal of trachoma granules tear off irregular patches of epithelium and, if the operation is roughly performed, areas of the membrane itself are removed. The swelling which now ensues increases the depth of the conjunctival crypts and folds and brings into close contact mucous surfaces, abraded and partly denuded of epithelium. If two opposed raw surfaces of these folds unite, the epithelial cells still attached to the conjunctival surface, or at the bottom of a crypt, and included within the folds, will thus be shut off from connection with the surface. Subsequent proliferation and degeneration of these segregated cells may result in the formation of a cyst. The practice of breaking up the inflammatory adhesions which follow expression usually prevents cyst formation.

Dr. E. L. OATMAN exhibited a case of cataract extraction followed by eversion of the flap and epithelial invasion of the anterior chamber which had been presented to the Section once before at the meeting December 28, 1905, and was reported in the ARCHIVES OF OPHTHALMOLOGY, vol. XXXV., p. 481. A cataract was extracted from the right eye in May, 1905. Forty-eight hours later, the flap was found completely everted. It was restored to position and satisfactory union took place. Six months later, glaucomatous symptoms developed. An iridectomy was performed and the excised portion of iris examined microscopically. Superimposed layers of epithelial cells were found on its anterior surface. At the present time the tension is high. Vision has gradually been reduced to bare perception of light. There has been no pain during the past year. The iris is represented by a strip of narrow, white membrane. The posterior surface of the cornea, particularly at the periphery, is covered with disseminated, white plaques. The left eye is entirely free from glaucoma. It is assumed that this is a case in which the surface epithelium extended into the anterior chamber during the time the flap was everted. The eye has steadily deteriorated without acute inflammatory exacerbations. It is, however, considered probable that the gradual extension of

epithelium into the angle of filtration will ultimately produce active glaucoma and loss of the eye.

Dr. H. KNAPP exhibited a small typical iris-cyst which showed a very complete picture by focal light and ordinary magnifying with a + 3 D. or + 4 D. The young man has a small iris-cyst which is a typical specimen of its kind. The patient was in the Dispensary of the New York Ophthalmic and Aural Institute under the care of Dr. H. H. Tyson, who brought him to me two days ago, with the diagnosis. By focal light a slight scar on the cornea and iris, without any inflammation. The scar in the iris was a small streak from the periphery to the pupillary vascular ring, where the cyst was attached, and extended in a small globe not larger than a millet seed. With focal illumination it is white, and apparently solid, but when it is viewed by focal light and ophthalmoscope lens of +3 or +4 D. it evidenced a transparent liquid which excluded the presence of solid contents. The eye is otherwise normal, and Dr. Knapp proposed to hold it under observation. If it enlarged, as these cysts ordinarily do, he would remove it with the bottom upon which it is situated. These cysts have a tendency to grow toward the corneo-iridic angle, where they grow and encroach upon the ciliary body.

In the discussion on Dr. Oatman's paper, Dr. J. E. WEEKS stated that in order for cyst formation to take place after operations, the membrane must be denuded of its epithelium, and in operations upon the conjunctiva where this denudation was extensive, adhesions and entropium resulted. For this reason the after-treatment of trachoma by separation of adhesions was very necessary.

Dr. ALGER thought that these cyst formations were always caused by unusual violence during operation, but they sometimes occurred in trachoma when no operation had been performed. The operation for trachoma should be performed more gently than it usually was.

Dr. E. S. THOMSON stated that every case of trachoma operated upon by expression, even when the cases are mild, was followed by some denudation of the epithelium, and fibrous formation which would cause adhesions. Cases should

be kept in the hospital until the tendency to the formation of adhesion had ceased.

Dr. F. N. LEWIS thought that, for the reason stated by Dr. Thomson, the after-treatment of trachoma cases was exceedingly important.

Dr. T. R. POOLEY had never seen the cystic formations after operation for trachoma. He believed that careful treatment was the principal means of preventing them. The operation of expression should be gently performed and no more trauma should be inflicted than is necessary.

Dr. E. GRUENING believed that the epithelium was always removed and that the opening up of the adherent folds was always necessary.

Dr. E. B. COBURN stated that few cases of expression were not followed by exudation; he thought there must be some peculiar condition—a tear of the conjunctiva for instance, with a circular constriction in order that cyst formation should result. After trachoma operations, re-formation of the adhesions took place for several days.

Dr. JOHN E. WEEKS read a paper entitled "What stage in the development of cataract, particularly senile cataract, is most suitable for its removal?" He stated that he had no doubt that all ophthalmic surgeons agree that the most propitious time for the extraction of cataract is when the lens substance is readily detachable from the lens capsule, and he considered the cataract "mature" in an operative sense when it had reached that stage. The types of senile cataract most frequently met with were described. It was held that the equatorial or ordinary cortical cataract had reached the most favorable stage for extraction when it was not swollen and when liquor Morgagni had formed between capsule and lens substance; that the nuclear cataract could be easily removed as soon as the lens was moderately shrunken and the vision reduced below that necessary to pursue the ordinary vocations of life. The anterior or posterior cortical cataracts were suitable for removal when the lens was not swollen and vision was reduced below that required for reading. The zonular cataract could be removed by extraction whenever the cataractous portion became so dense that vision fell

much below $\frac{1}{10}$, particularly if this occurred in an individual above forty years of age. For economic reasons it was sometimes necessary to remove cataract before the most favorable time in its development is reached, namely, at the earliest time compatible with safety. Since, as is well known, the greater part of the lens substance escapes from the lens capsule with the nucleus in operations for its removal, after the patient has passed the age of forty years, it is permissible to remove all but swollen cataracts as soon as they had advanced sufficiently far to abolish useful vision. Dr. Weeks has abandoned the operation for ripening immature cataract, as it has not proved to be of sufficient value in his hands to warrant its continued use. Statistics of twenty-five extractions of immature and zonular cataracts were given in which there were no losses. The lowest vision obtained was $\frac{1}{10}$. In 52 per cent. of the cases the ultimate vision was $\frac{1}{10}$ or better. The author did not wish to convey the impression that he operated by preference on immature cataract, but that he did not hesitate to do so in cases in which the necessity of securing good vision at the earliest possible time was very urgent.

In the discussion on Dr. Weeks's paper, Dr. E. GRUENING stated that many cataracts were sufficiently transparent to allow of serviceable distant vision, but not sufficiently transparent to permit the person to do useful near work, and that in many of these cases the lens was sclerosed and extraction could be safely performed. He did not operate in cataract that was really immature. If there was a large and transparent cortex, it was, as a rule, better to wait, but if the patient insisted upon operation it was usually better to perform a preliminary iridectomy. At times, however, the surgeon was compelled to perform extraction at one sitting, for, sometimes, the patient would not submit to a double operation. In zonular cataract, extraction could be performed without waiting for complete ripening of the lens. This could be preferably done by removing the nucleus and as much soft cortex as possible at one sitting, leaving the rest of the cortex to be absorbed. Removal of a cataract in its capsule was, of course, the ideal operation, but on the-

average the results were less favorable than by the ordinary methods, for the loss of vitreous which might result was sometimes the cause of subsequent detachments of the retina and hemorrhage at the time of operation.

Dr. T. R. POOLEY stated that in immature cataract he was opposed to operation as a general practice. Of course, when both eyes were about equally affected a patient was reduced to serious straits on account of the double loss of vision and the operation might be rendered necessary, but these cases were not very common. Nuclear cataract and sclerosed lenses could be removed before completely ripe without much danger. Zonular cataract was very difficult to deal with, for one could not be sure of removal of all the soft lens substance and, in these cases, a preliminary iridectomy was a good thing. In any case of cataract extraction, when it was known that the eye was highly myopic a preliminary iridectomy was to be performed.

Dr. E. S. THOMSON made it a rule to operate as soon as the lack of vision in the better eye incapacitated the patient, except when the lens was much swollen or when much soft lens matter existed. How to distinguish clinically when these conditions are present is very difficult. When the lens is sclerosed the state of affairs is evident, but in the ordinary cases with striæ from the equator it is very hard to tell. He never performed extraction in the capsule unless he was compelled to. When there was much soft lens matter he preferred the simple operation and did not like to operate in two stages. The position he took upon the time to operate in cataract depended principally upon how far he could determine the presence or absence of soft lens matter.

Dr. H. KNAPP stated that removal of the lens in the capsule was not difficult if the section was made below. He does not like to operate on immature cataract for some particles of soft lens matter are sure to be left behind. When much cortex was left behind, he irrigated with a special syringe. This syringe resembles an ordinary hypodermic with a short angular tip. It was made of glass, the piston working very tightly, and the whole syringe could be disinfected by boiling. He also used the syringe to inject salt solution when much

vitreous had been lost, and also to syringe out the anterior chamber when it contained much blood.

Dr. E. B. COBURN did not believe in inflicting too much trauma in order to remove soft lens matter, and believed that too long a time should not elapse between the primary operation and the discussion of the capsule, if this should be necessary, for a connective-tissue formation took place which made discussion, with the increasing lapse of time, correspondingly difficult. With a swollen lens and a shallow anterior chamber, one should not operate, but, if we found much sticky cortex during the operation, we should take time and carefully extract the soft lens matter.

Dr. J. E. WEEKS, in closing, stated that, while the extraction of immature cataract was attended by many difficulties, the hardships often inflicted by waiting rendered early extraction in some cases perfectly justifiable.

SYSTEMATIC REPORT ON THE PROGRESS OF OPH- THALMOLOGY IN THE THIRD AND FOURTH QUARTERS OF THE YEAR 1905.

By Dr. G. ABELSDORFF, in Berlin; Prof. St. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the Assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and Others.

Translated by Dr. MATTHIAS LANCKTON FOSTER.

Sections VIII.-XII. Reviewed by DR. R. SCHWEIGGER, Berlin.

(Continued from page 169.)

XI.—CONJUNCTIVA.

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FORTUNATI (887, Ricerche sperimentalali sulla etiologia del catarro primaverile) has succeeded in isolating two pathogenic blastomycetic forms of catarrh. The first is harmless, the second causes little nodules similar to those present in vernal catarrh, which are frequently recurrent, especially in the hot part of the year.

CIRINCIONE.

POSEY (888, *Conjunctivitis petrificans*) describes the case of a negress thirty years old who for almost twenty years suffered from very severe inflammation of both eyes which recurred every two months. Investigation of the lids revealed numerous yellowish-white, slightly elevated places beneath the epithelium of the conjunctiva in the florid stage. These were most numerous in the tarsal conjunctiva of the upper lids, and were wanting in the bulbar conjunctiva. There was a superficial infiltration of the cornea below with new formation of blood-vessels. There were no pain or discharge and only slight photophobia. The excised granules contained an inorganic salt, probably lime. Posey believes it to be a mild case of the very rare *conjunctivitis petrificans*.

ALLING.

It is well known that irritation of the respiratory tract may be excited by the effluvia of different animals. POSEY (889, *Conjunctival irritation caused by the proximity of a horse*) reports two cases in which the eyes were similarly affected by the proximity of a horse. The nature of this neurosis (?) is unknown, but it has a certain resemblance to hay-fever.

ALLING.

GRIFFIN (890, *Parinaud's conjunctivitis*) saw a conjunctivitis with secretion which within a few days became purulent. In the lower conjunctival fold there were polypoid growths, the surfaces of which were ulcerated. Later the preauricular glands became inflamed and general symptoms appeared. The cause of the infection was undetermined.

ALLING.

CASPAR (891, *Parinaud's conjunctivitis*) met with a case of this disease in a six-year-old girl. The conjunctival infiltrates were covered in places by diphtheritic patches, but had a good tendency to heal. The nodules in the skin suppurated.

SCHOLTZ (892, *Parinaud's conjunctivitis*) saw in an elderly woman who had inflammation of the lachrymal sac a disease of the conjunctiva, which he considered an atypical or rare form of Parinaud's conjunctivitis. The large proliferations were absent from the monolateral swelling of the conjunctiva, but the yellow nodules distributed through it were similar to them. There was a suppurating lymphatic gland in the neck. A

bacillus was obtained from the conjunctiva which was extremely like that of hen cholera. The lachrymal sac contained only staphylococci, the pus in the gland contained no bacilli, treatment consisted of applications of a 1% solution of nitrate of silver with partial scraping, and the case was nearly well in three weeks.

The staphylococcus pyogenes, which is a very frequent saprophyte in the normal conjunctival sac, can, according to POULARD (893, *Staphylococcic infection*), produce by infection a quite characteristic disease of the conjunctiva. He describes several cases. A muco-purulent conjunctivitis which shows a tendency to the formation of membranes appears during, or as a sequel to, an hordeolum. The membranes are thrown off spontaneously, or may be easily removed mechanically. The conjunctiva is chiefly affected at the folds. Frequently the lower lid is erythematous and swollen. The pre-auricular gland is enlarged and tender to pressure.

BERGER.

THORNER (894, *Metastatic gonorrhœal conjunctivitis*) reports four cases he considers metastatic from gonorrhœa with gonorrhœal rheumatism, although no gonococci were found. He believes that virulent gonococci were present in the conjunctival vessels, but that they could not spread into the tissues, analogously to many observations regarding tubercle bacilli, and therefore could not be found in the secretion.

STEVENS (895, *Septicæmia*) reports a case of ophthalmia neonatorum which made satisfactory progress until the eleventh day, when he noticed redness and swelling of a finger. The next day the knee and ankle were involved and later when incised showed gonococcus pus. Endocarditis set in and the child died seventeen days after the beginning of the ophthalmitis.

ALLING.

SCHRIDDE (896, *Ophthalmia neonatorum, histology*) found the ocular conjunctiva fairly intact in an infant which had died while suffering from blennorrhœa. The retrotarsal fold and the palpebral conjunctiva were very foul and permeated with neutrophile leucocytes. The epithelium was loosened in places and here and there were particularly large numbers of leucocytes and gonococci. These lay in bands free between

the cells in the subepithelial connective tissue, and only on the surface were they enclosed in the leucocytes. In places where the affection had progressed farther there were ulcers, total destructions of epithelium of microscopic size, from the bases of which granulated tissue was springing.

The case observed by SUKER (897, Gonorrhœal ophthalmia involving the anterior ethmoid cells) had a gonorrhœal conjunctivitis, complicated with cellulitis of the orbit and ethmoiditis. On the fifth day the ethmoid cells were opened and drained. On the eleventh day the inflammation in the nose was better, but perforation of the cornea had occurred. The eye recovered with a cystoid cicatrix. Later the iris was excised and the wound covered by a conjunctival flap. Still later an iridectomy was performed and useful vision obtained.

ALLING.

MEYERHOF (898, Purulent conjunctivitis in Egypt) examined bacteriologically 300 cases of purulent ophthalmia in central Egypt. He found the Koch-Weeks bacillus 157 times, gonococci 80, diplobacilli 37, pneumococci 10, and either rarer bacilli or none at all 16 times. The number of cases is tripled in mid-summer. Thirty-seven cases had pseudo-membranes. The extension of the gonococci appears to be really extragenital and they are scarcely met with in the eyes of infants. Trachoma often conceals quantities of gonococci which are inactive, but sometimes they destroy eyes which show the scars of trachoma.

GOLDZIEHER (899, Pathology of trachoma) claims that acute blennorrhœa may pass into a chronic conjunctivitis in which cicatricial thickenings of the conjunctiva with subsequent contraction not infrequently develop. Such a chronic infectious disease he thinks cannot be differentiated from trachoma with papillary swellings developed to a certain degree. He does not consider granules a pathognomonic symptom. He does not consider pannus a specific product of trachoma in the sense that it is brought about by a new formation of trachomatous tissue on the cornea. But he lays stress upon the fact that the interior of the tarsus is always involved.

BECK (900, Radium in trachoma) presents three cases of trachoma treated by radium, two of which were cured. He

applies a sealed tube for ten minutes every day. He asserts that trachomatous conditions are "beautifully acted upon and absolutely cured" by radium. ALLING.

WIESINGER (901, Trachoma and its treatment) inclines to the opinion that pannus is a true trachoma of the cornea, rather than the result of mechanical injury by the degenerated conjunctiva. He uses the copper stick only to produce a superficial irritation in order to promote resorption of the follicles by increased metabolism. He speaks well of massage of the trachomatous conjunctiva with a glass ball.

FEJER (903, Contributions to the clinical picture and the pathological histology of tarsitis trachomatosa) found in a young man with trachoma a chronic thickening of the tarsus, as hard as a board, in which he expected to find amyloid or a similar degeneration. He cut away from the upper, sharply bent, convex margin of the tarsus a piece 20mm long, 7mm broad, and 3mm thick. The cut surface was insensitive, bloodless, gray, and hard. Hyaline degeneration was present, which he considers a high degree of tissue necrosis. The hyaline did not give a sure microchemic reaction; it varied with the different stages of degeneration, but histologically the characterization was clear. The degeneration must, in his opinion, precede a chronic inflammation of the conjunctiva.

GUTTMANN (904, Local anaesthesia) injects cocaine $\frac{1}{2}$ to 1 %. with a 2 % salt solution subconjunctivally in the lids and about the tarsus. Addition of adrenalin and the normal salt solution gave bad results, as did also anaesthetization with cocaine crystals.

BOLDT (905, Kuhnt's shelling out of the cartilage in the treatment of trachoma) states that Heisrath practises excision of the conjunctiva and cartilages as his method, while Kuhnt only shells out the cartilage.

BIRCH-HIRSCHFELD (906, Radium in trachoma) tested radium on ten cases of trachoma and found that the follicles disappeared within a day after the exposure, but recurred, and the old methods of treatment had to be resorted to to obtain a permanent cure. He examined the exposed material microscopically and criticises the reports of cures by other

authors. He recommends not to expose the eyeball to the rays, but rather to protect it thoroughly.

This sharp limitation of the use of radium the same author (907) urges in his supplement.

THIELEMANN (908, Radium in trachoma) demonstrates a marked influence, macroscopically and microscopically, on distinct forms of trachoma, the permanency of which is uncertain.

STARGARDT (909, X-rays and trachoma) exposed for twelve minutes with weak tubes at short distances the everted retro-tarsal folds of patients with trachoma, and then investigated them microscopically. He found changes in the follicles similar to those seen in the spleen, destruction of nuclei, increase of phagocytes and giant cells, decrease of nuclear segmentation. Even though these signs diminished from day to day after the exposure yet there was a permanent diminution of the follicles. He considers the use of the X-rays in the trachoma, with the danger of re-infection, less to be recommended than the operative treatment.

JACOB (910, Statistics of trachoma) finds females in the minority, but preponderating in the severe cases. The disease occurs at all ages, most frequently in the second and third decades. Predisposition from general disease was not shown, heredity was not proven. People who work in dust are predisposed to it by their occupation. The great number of domestics was remarkable. Some investigations of families and an epidemic are described in detail. Mild cases of trachoma formed only one-fifth of the entire number. Medical treatment continued for a long time gave satisfactory results. Excision of the retro-tarsal folds was reserved for extreme cases. Expression, together with medical treatment, was almost always curative.

HORNICKER and ROMANIN (911, X-rays and trachoma) have constructed an apparatus by means of which the everted lids alone are exposed to the X-rays. They are much pleased with the results they have obtained.

SCIOLTZ (912, Trachoma in Hungary) finds a marked decrease in the numbers of persons with trachoma in Hungary, especially in regions where treatment is obligatory. Recur-

rence is much rarer than in East Prussia. Hospital treatment with mechanical removal of the granules is of prime importance.

KUWABARA (913, Extension of trachoma) investigated carefully the region about his home in Japan for trachoma and found a very large number of cases, particularly among the children. The hygienic and social conditions of the region are very unfavorable.

RAY (914, Vernal conjunctivitis in the negro) has seen ten cases of vernal conjunctivitis, all of which occurred in the negro. He has never observed a case in which the palpebral conjunctiva showed the characteristic lesions. He finds, however, at the sclero-corneal margin and encroaching more or less on the cornea, elevated gelatinous-looking masses. In one case the process had left only a small portion of the cornea clear. The hyperplasia is practically part of the cornea and cannot be separated from it without cutting. Under the microscope there is found thinning of the epithelial layer of the cornea and the projection downward of club-shaped columns of epithelium with the formation of cavities in the deeper layers.

ALLING.

GILBERT (915, Conjunctival tuberculosis) reports 19 cases of conjunctival tuberculosis observed for a long time in the clinic at Bonn. Sattler's groups 1 and 3 were completely cured by removal of the diseased tissue by operative measures and caustics. This treatment is frequently contraindicated in groups 2 and 4, in which the tuberculous process had invaded the cornea and deeper parts. In such cases tuberculin R is indicated.

LUNDSGAARD (916, Conjunctival tuberculosis) has treated in the last three years 4 cases of primary tuberculosis of the conjunctiva and 11 cases of lupus of the conjunctiva. He speaks of the etiology, onset, clinical course, and diagnosis of the disease, presents the clinical histories of his own cases, and in conclusion mentions the therapeutic measures hitherto commonly employed.

As regards his own cases he obtained in those which were non-operative the best results from the light treatment which was employed in 3 cases. One patient with very extensive

lupus vulgaris, who had undergone various forms of treatment for five years without benefit, had one eye completely cured after 6 treatments with light. After 19 treatments of the other eye a remaining portion, as large as a pea, had to be excised because it could not be reached with the pressure glass. The second patient had lupus of the conjunctiva of both lids of the left eye and of the lower lid of the right. He had been treated by injections of formalin without benefit. The process was cured in each of the lids by 6, 6, and 10 treatments respectively. The third patient had lupus vulgaris of the nose, lip, nasal cavity, gums, and larynx, as well as of the conjunctiva of the lids of both eyes. The conjunctival trouble was cured after 9 and 7 treatments with light.

In the application of the light treatment to the conjunctiva, the eyelid is everted, the eye covered with wet cotton and a piece of paper; the pressure glass is placed on the everted lid and pressed against the margin of the orbit. The treatment can then be applied for one or two hours without real discomfort to the patient. The conjunctiva bears the light reaction better than the skin, and in Lundsgaard's opinion the light treatment is more effective in diseases of the mucous membranes than in those of the skin. As to the influence of this treatment on primary tuberculosis of the conjunctiva he cannot yet assert anything positive. The period of observation in all the cases was short. He thus sums up his results:

1. When a conjunctival tuberculosis is small enough so that a radical extirpation, extending a couple of millimetres beyond its margin into healthy tissue, is possible, this treatment should be adopted.
2. When the lesion is too large for this, but has not extended to the ocular conjunctiva, light treatment should be employed.
3. When this is impossible because the disease has extended to the eyeball, tuberculin should be tried.
4. Platina candens, curetting, etc., must be considered aids and not principal methods of treatment.

HILLGREN.

MELLINGHOF'S (917, Vaccinal conjunctivitis) little one-year-old patient infected his conjunctiva from his arm a week after

vaccination. He recommends the application of a bandage and that the child should use his own bed and wash-bowl.

KÖRBER (918, *Pemphigus of the conjunctiva*) met with a case of pemphigus in a man fifty years old. The patient had acquired syphilis three years before, but had been well treated and had no secondary symptoms. For a year he had had diabetes and nephritis. For six months he had had bullæ on the gums and on the glands. The disease was common pemphigus, which shows itself first on the mucous membranes and later on the skin.

AGRICOLA (919, *Congenital xerosis*) found in a person eight years old, and also in another eighteen years old, a chalky-white, sharply defined, elevated spot on the temporal part of the cornea, corresponding to the palpebral fissure, the surface of which was rough, dull, and peculiarly foamy as if covered with fat, not moistened by the tears; xerosis bacilli were easily obtained from it. The spots were excised on account of their appearance. In both cases they were congenital and were associated with no local inflammation. Agricola identified them with descriptions of callosities of the conjunctiva and keratosis conjunctivæ.

HERBERT's (920, *Colloid degeneration of tarsus and conjunctiva*) first case was that of a woman thirty-nine years old whose right upper lid alone was affected. The lid was swollen and hung down as the result of the marked thickening and vertical enlargement of the tarsus. The tarsus and conjunctiva had a yellowish appearance. A large part of the waxy tissue was removed with little loss of blood. The second patient was a twenty-five-year-old Hindoo whose right upper lid was swollen. The tarsus was much thickened and consisted principally of two hard masses covered with conjunctiva, which were shelled out after the latter had been divided. Some traces of true bone substance were later found in the sections of one mass, but not of the other. After the incision a quantity of soft, wax-like tissue was pressed out of the swollen retro-tarsal conjunctiva. The histological condition is accurately described and illustrated by three microphotographs.

DEVEREUX MARSHALL.

STIEREN (921, *Cyst of conjunctiva, containing an embryo-*

onic tooth-like structure) removed a cyst of the ocular conjunctiva of a girl aged sixteen. It was first noticed six years before. It contained a straw-colored fluid and an incisor tooth.

ALLING.

According to SHASTID (922, Pterygium), a vertical tunnel is always present underneath a true pterygium at the sclero-corneal junction, at least in all those cases which are progressive. One always finds degenerated tissue under the pterygium, hence such an assertion is hard to prove.

ALLING.

ALT (923, Pinguecula and pterygium) believes that in most cases pterygium originates from the pinguecula. The process is supposed to be by a slow inflammatory action in the conjunctival tissue which separates the pinguecula from the corneal border. New tissue is thus formed which grows into the cornea between the epithelium and the parenchyma in the plane of Bowman's membrane, which is destroyed by an army of leucocytes in advance of the on-coming head. The new-formed tissue draws the pinguecula and the conjunctiva on to the cornea. His studies of the pinguecula led him to conclusions in general similar to former observers. He finds the epithelial layer, as a rule, of normal thickness, although in exceptional cases it is greatly hypertrophied. Underneath is found hyaline degeneration of the conjunctiva, and also granular-appearing tissue composed of degenerated elastic fibres.

ALLING.

BOCK (924, Diseases of the caruncle) removed from the caruncle of a healthy man a grayish-brown tumor as large as a millet-seed, which proved under the microscope to be a melanotic, round-celled sarcoma. Twice he has removed from the caruncle of an otherwise healthy eye a tumor as large as a pea, covered with pus, which was composed of granulation tissue and in one case at least contained a foreign body.

GÜNSBURG (925, Cysts of the plica semilunaris) extirpated cysts of the semilunar fold from two patients. In one the conjunctiva showed trachomatous cicatrices, in the other the eye was glaucomatous. One was vertically oval, as large as a pea, the other was biscuit-shaped. Vessels ran over the surface of both. Both had the appearance of blebs and their con-

tents consisted of two layers, the upper semitransparent, the lower opaque, and their position in the cysts varied with changes in the position of the patient. The microscopical examination showed that the inner wall of the cyst was lined with two layers of epithelium, that in the preparations of both cysts sections of round passages were met with which were lined with high cylindric epithelium, that in the first cyst the epithelium which covered the outer wall penetrated in the form of a firm epithelial cord in which the innermost layer of epithelium exhibited the commencement of a mucous degeneration, and that in the second cyst sections of a gland composed of round lobules was met with in the immediate neighborhood of the cavity of the cyst. The author places the cyst in the trachomatous eye, with the epithelial outgrowth, with the epithelial cysts in which the trachoma is the cause of the epithelial changes. The preparations show that, contrary to the opinions of Cirincione, Ginsburg, and others, the conjunctival epithelium is able to proliferate deeply in certain diseases. The second cyst he considers a glandular cyst which originated in the glandula Garderi.

HIRSCHMANN.

SACHSALBER (926, Pinguecula and pterygium) asserts that a condition of chronic conjunctivitis in general and about the inner canthus in particular may be produced by the presence of lanugo hairs, and that a pinguecula and finally a pterygium may develop as the result of this mechanically produced conjunctivitis. The action of the mechanically produced conjunctivitis may spread in the region of the palpebral fissure and produce pinguecula on the temporal side. Pinguecula is often brought to a standstill by the pre-senile loss of hair, when the lanugo hairs disappear. It is best to use a loupe in order to see them. A pterygium develops only when very strong and numerous lanugo hairs are present, and is not greatly influenced by external injuries.

According to Fuss (927, Pinguecula and its hyalin), in the formation of a pinguecula there is first an increase of the reticular and fibrillary connective tissue with oedematous swelling and slight cell infiltration. Then follows a hyaline swelling of the connective tissue of the conjunctiva, due to a deposit of a

homogeneous substance. The degeneration closes with the appearance of a substance analogous to elastic tissue which he calls "elastoid."

SCHAFFRINGER (928, Epitarsus) reports his twelfth case of epitarsus, which he accidentally found. It gave the impression of a tarsus healed in intra-uterine life.

VAN DUYSE (929, Hyaline lymphomatous proliferation of the conjunctiva) observed in a man twenty-three years old, a conjunctival trouble confined to one eye, which had been diagnosed first as syphilitic by other ophthalmologists and treated with mercurial inunctions, and afterward as monocular trachoma. Van Duyse made the diagnosis of a hyaline degeneration of the bulbar conjunctiva of the right eye and excised a small piece. Microscopic examination demonstrated the condition to be a lymphomatous hyaline proliferation of the conjunctiva. As Heineke found the X-rays useful in leucæmia, Van Duyse thought this method of treatment might be beneficial in such a case as this, and its application was followed by a perfect recovery.

BERGER.

The tumor described by AYRES (930, Epibulbar papillo-epithelioma) filled the entire orbit and protruded about $3\frac{1}{2}$ cm. The eyeball was completely surrounded. The mass was enucleated and proved to be a mixed growth, in some parts purely papillomatous, in others quite characteristic of epithelioma. It had its origin at the sclero-corneal margin. One year later there had been no recurrence.

ALLING.

CARLINI (931, Angioma of the conjunctiva) removed a tumor from a child five years old. Its histological examination showed that it was a true conjunctival angioma.

CIRINCIONE.

ISCHREYTT's (932, Epidermoid) patient, a man fifty-six years old, had noticed for perhaps nine months a little yellow nodule on the conjunctiva which seemed to gradually increase in size, but caused no annoyance. The tumor was smooth, 4 mm in diameter, of fatty yellow color, opaque, and lay beneath the conjunctiva, with which it was freely movable. It was excised together with a fold of conjunctiva, and proved to be a cyst, which Ischreyt considers a simple epithelial cyst which

originated from a congenital displacement of conjunctival epithelium.

VAN DUYSE (933, Epibulbar tumor), observed in a three-years-old child an epibulbar tumor which had the clinical appearance of a dermo-lipoma. Microscopic examination of the tumor, after it had been excised, showed that it was composed of foam cells (Schaumzellen), similar to those already observed by the same author in xanthoma of the ocular conjunctiva.

BERGER.

CLEGG'S (934, Epibulbar sarcoma) patient, a woman fifty-four years old, had a pigmented, fleshy tumor on the limbus and neighboring portion of the cornea, which had lasted nine months. The eye was enucleated and the tumor found under the microscope to be a melanosarcoma. It had only slightly involved the substantia propria. DEVEREUX MARSHALL.

The tumor described by GUENSBURG (935, Epibulbar leucosarcoma) was removed from the lower temporal part of the limbus and the wound covered by a conjunctival flap. There was no recurrence at the end of three and one half years.

HIRSCHMANN.

COSMETTATOS (936, Epibulbar leucosarcoma) found a pure round-celled leucosarcoma beneath the conjunctiva near the limbus, where the patient, a girl fourteen years old, had shortly before received a blow. It was separated from the epithelium by a hyaline membrane. These growths are usually benign.

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

937. BRUNS, H. D. Contact keratitis after cataract extraction. *Ophthalmic Record*, Sept., 1905.

938. FRANK, M. Corneal cyst, with report of a case. *Annals of Ophthalmology*, July, 1905.

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965. JOHNSTON, R. H. Pathology of pterygium. *Ophthalmic Record*, April, 1905.
966. KUGEL, L. A contribution to Wecker's tattooing of corneal cicatrices. *Arch. f. Ophthalmologie*, lxii., 2, p. 376.
967. VON HIPPEL, E. Membrana pupillaris persistens cornea adhærens. *Arch. f. Ophthalmologie*, ix., 3, p. 444.
968. FISCHER, GEORGE. A case of papilloma of the cornea. *Inaug. Diss.*, Tuebingen, 1905.
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971. MENACHO, translated by GOERLITZ. Melanosis of the right eye, cornea, conjunctiva, and iris, and multiple melanotic epibulbar growths on the cornea and limbus of the left eye. *Klin. Monatsbl. f. Augenheilk.*, xliii., 2, p. 359.
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BRUNS (937, Contact keratitis) operated for a cataract upon two ill-nourished, anæmic patients. The anterior chambers did not refill for some days and a central interstitial opacity of the cornea developed. Upon close inspection he discovered portions of the capsule in contact with the posterior surface of the cornea and he attributes the condition to this cause. With the refilling of the anterior chamber and consequent removal of the capsule the opacity cleared. ALLING.

FRANK (938, Corneal cyst) describes a cyst-like growth in the cornea at the apex of a pterygium. It was found to contain about two minimis of almost colorless fluid. It had no connection with the anterior chamber. The cyst had existed about fifteen years. The anterior portion was formed by conjunctiva and lined with flattened stratified epithelium. The posterior portion was formed by a thin scale of tissue, probably separated from the cornea by pressure necrosis and was lined by corneal epithelium. Bowman's membrane was present in some places. ALLING.

The first case described by WADSWORTH (939, Discoloration of the cornea by blood pigment, and hemorrhage into the cornea) was injured by a contusion which ruptured the cornea and filled the anterior chamber with blood. The discoloration observed in the cornea proved, under the microscope,

to consist of yellow granules within the stroma. They appeared to be hematoidin.

ALLING.

SPITTA (940, Family degeneration of the cornea) describes the twenty cases of this disease which he has examined during the past year in the clinic at Tuebingen. The twenty cases came from eight families and six places in the Alps. Nothing certain in regard to the etiology was ascertained.

FLEISCHER (941, Family degeneration of the cornea) continues Spitta's work, and has tabulated all observations yet made. Of the thirty-four cases met with in the clinic at Tuebingen, eighteen had superficial coarse nodules and flakes which greatly injured the vision. The marginal parts of the cornea were also not quite free from changes, especially in the region of the palpebral fissure. The second group of sixteen cases exhibited under the corneal microscope little opaque elements often scattered through the entire depth of the otherwise clear cornea. In these cases the middle of the corneal surface is also slightly rough. A third group of three patients had the punctate opacities arranged in circles with clear intermediate substance and a smooth surface. Symptoms of general disease, or of disease of other membranes of the eye, were wanting in all cases. Tuberculosis or lupus is not present. Geographically the patients came from the thinly populated Swabian Alps, where in-breeding cannot be excluded, even though consanguinity is not proved. Other forms of degeneration are found in this region, imbecility, very high myopia, amblyopia, and very frequent regular astigmatism. Fleischer is of the opinion that this is a family degeneration of the cornea which appears in many forms, but possesses true characteristics. The disease frequently begins before the age of puberty, has developed so far at the age for military service that the persons are disqualified frequently, and becomes disabling in the fourth or fifth decade. Men and women are affected about equally.

DOYNE and STEPHENSON (942, Family degeneration of the cornea) report a family of which five members suffered from a remarkable degeneration of the cornea. The first case was that of a twelve-year-old boy who had had frequent inflamma-

tions of his eyes for a year. The appearance was originally like that of a calcified membrane. The father of the boy, a man forty-eight years old, stated that he had had ulcers of the cornea at the age of thirty-nine. Both of his corneæ exhibited marked degenerative changes; the vision of his right eye was reduced to movement of the hand, that of the left to $\frac{1}{6}$. His mother had had bad eyes when young and became blind when she grew old. Of the other members of this generation, three sisters and a brother, a sister, who was dead, had suffered from a similar disease. The mother of the patient first mentioned had good vision. Of the eight living children of this family; four, including the above-mentioned case, had diseased eyes; the remaining three were girls. In three generations of this family, therefore, seven cases of a slowly progressive bilateral degeneration of the cornea were observed, which, after existing many years, produced a great loss of vision. The literature on the subject was quoted and brief accounts of other cases given.

DEVEREUX MARSHALL.

SEEFELDER (943, Congenital corneal opacity) saw in three infants congenital opacities of the cornea with leucoma adherens, anterior polar cataract and phthisis bulbi, some with unirritated conjunctiva, some with episcleral injection. He ascribes the trouble to a foetal inflammation of the anterior uveal tract. Probably there was an extremely thick infiltration of the parenchyma, which broke down on the inner surface during foetal life.

SEEFELDER (944, Corneal changes from increased tension) found laceration of Bowman's membrane in perhaps half the cases of hydrophthalmic eyes in children, and laceration of Descemet's membrane, in all nine cases. Together with Bowman's membrane, the epithelium was often torn and lifted off, and sometimes also the most superficial lamellæ of the cornea. A great many of the dehiscences of Bowman's membrane were joined by thickenings so that it appeared fissured and exfoliated. The endothelium of Descemet's membrane was always present. The author lays stress on the fact that in his preparations the lacerations of Descemet's membrane surpassed those of Bowman's from the earliest stage of the increased tension. The ruptures were frequently several in one and the

same cornea, with no regular arrangement. In Bowman's membrane they could not be recognized with certainty clinically, in Descemet's they were usually characteristic. In juvenile glaucomatous eyes the corneal radius of both meridians is greatly increased so that the cornea is flattened.

Bowman's membrane can become wavy and folded, the same as Descemet's, but when this condition exists it usually escapes notice. WEICHE (945, Corneal opacities due to folds of Bowman's membrane) has demonstrated this anatomically on an eyeball with phthisis quadrata. The corneal epithelium fairly compensated for the folds. There were striated opacities in the cornea due to the behavior of Bowman's membrane. The parenchyma was involved in these folds to a certain depth; the posterior layers appeared almost smooth. Descemet's membrane was also folded. The folds of both were arranged vertically.

BARTELS (946, Connective tissue on the posterior surface of the cornea) found a compact deposit on Descemet's membrane in four eyes, which presented the appearance of a kind of connective tissue. It was for the most part poor in nuclei, but in one case it was rich in nuclei. In this case there was no perforation of the cornea, but an iridocyclitis of spontaneous origin. The deposit did not originate from the iris, but was an organized exudate. The clinical picture showed large patches on the posterior surface of the cornea which usually gradually lost their color and by contraction brought iris and cornea together at the angle.

In an eye with megalocornea AXENFELD (947, Isolated dehiscences of Descemet's membrane) discovered several bright, double contoured lines that appeared with the loupe to be on the posterior surface of the cornea which presented nothing else remarkable. Axenfeld considers them to have been lacerations and folds of Descemet's membrane produced by increase in size of the cornea. His second observation was of an acute, painful exacerbation of a keratoconus through a spontaneous rupture of Descemet's membrane. A small, lance-shaped, double contoured, bright place, a fissure in Descemet's membrane could be seen with the largest loupe.

MELLER (948, Corneal sclerosis) examined two eyes which had

long been blind, the corneas of which were white. The blindness ensued after the removal of a luxated lens and a traumatic cataract. In one case the process of gradual white discolouration proceeded outward from the posterior wall of the cornea. The cause of the degeneration of the endothelium was ascribed to a change in the aqueous which produced an opaque swelling of the cornea. The other case was one of the so-called degenerative pannus which made the cornea appear white as the result of unevenness of the surface, changes of the epithelium, the formation of blebs, etc.

JOCQS (949, Sclerosing keratitis) reports the case of a girl in whom as the result of a diffuse scleritis an interstitial nodular keratitis developed which persisted for several months and then quickly disappeared after the use of dionin with iodogenol. He does not believe that this sclero-keratitis was of a tuberculous nature.

BERGER.

KUNTZ (950, Keratitis and acne rosacea) describes two cases in which acne rosacea of the face was complicated by a subepithelial inflammation of the parenchyma of the cornea which had a tendency to progress slowly toward the centre with marked symptoms of irritation and the formation of vessels in the cornea. In one patient there was a little nodule of acne rosacea in the conjunctiva outside the limbus. The eye recovered as soon as the acne of the face was cured.

The bacteriological examinations of ten cases of typical fascicular keratitis made by ADDARIO (951, Fascicular keratitis) bring him to the conclusion that the so-called vascular bands produce a transformation of the so-called phlyctenulæ, which develop some into keratitis fascicularis, some into pustules, and some into the so-called Stellwag's herpetic bridge.

CIRINCIONE.

In the three cases reported by DE LIETO VOLLARO (952, Keratitis disciformis) there was a deep infiltration which formed whitish points in various levels of the cornea and opaque bands on Descemet's membrane. The cause was traumatic, the result a dense leucoma. In agreement with Fuchs he believes that he had here to deal with an agent of slight virulence. There are many points of resemblance to the forms of keratitis caused by inoculation, particularly the presence of a dense

areola which separates the inflamed place from the rest of the transparent cornea. He emphasizes the difficulty of differentiation of this form of disease from the interstitial keratitis due to general causes when the signs of traumatism are absent and the suspicion of general disease cannot be excluded.

CIRINCIONE.

According to PETERS (953, *Keratitis disciformis*) keratitis disciformis is not a specific disease of the cornea, but only a variety of herpes corneæ which can attack certain different layers of the cornea and produce an oedema of the epithelium, a superficial ulcer, a parenchymatous opacity, or a deep infiltration of the cornea. A relationship exists between large classes of traumatic corneal diseases and herpes corneæ, and herpetic eruptions after traumatism are not rare.

In an eye which had been blinded by keratitis disciformis MELLER (954, *Keratitis disciformis*) found that the disk-like form of the trouble was due to an organized disk of exudate on the posterior surface of the cornea. He considers this extraordinary, as well as the involvement of the uvea in this case. The specificity of the corneal process lies in the necrosis of the infiltrate. The focus is circumscribed, the rest of the cornea is sound except for little secondary changes. An inflammatory infiltration spreads from a place of infection on the surface which soon stops spreading and becomes necrotic. It is surrounded by a gray margin. The necrotic place can be easily removed in many cases. A central very injurious scar is always the outcome of the process.

The real primary parenchymatous keratitis studied by ELSCHNIG (955, *Parenchymatous keratitis*) is not a true syphilitic disease, nor is it the direct result of obliteration of small arteries by syphilitic disease of their walls. It is much more probable that the cause of the disturbance of nutrition which affects the fixed corneal corpuscles is the pathological condition of the tissue lymph.

STOCK (956, *Ulcers in parenchymatous keratitis*) examined microscopically an eyeball with fresh parenchymatous keratitis. Descemet's membrane was eroded, and the leucocytes entered the parenchyma through various places. From another patient preparations were obtained of older, completely

healed parenchymatous keratitis. In this case also Desemet's membrane was defective and some lamellæ of the cornea had been destroyed, but the lesion had cicatrized, endothelium had covered the place, and a new vitreous membrane had been formed.

ANTONELLI and BENEDETTI (957, Rare syphilitic keratitis) describe the following rare syphilitic diseases of the cornea:

1. Chancre of the cornea, of which only one case in man is recorded, but can be clinically produced in apes by infection.
2. Keratitis ulcerosa of the secondary and tertiary stages. The abrupt margins of the ulcer, the coincident appearance of the symptoms of secondary syphilis, and perhaps the microscopic demonstration of the presence of the spirochæta pallida, serve to point out the syphilitic nature of the ulcer. Two cases have been described.
3. The keratitis punctata of Mauthner, which these authors believe to be a disseminated form of parenchymatous keratitis ex lues acquisita.
4. The syphilitic keratitis nodosa of Wicherkiewicz, which appears to the authors as an intermediate form between keratitis punctata and keratitis gummosa, and is met with chiefly in pseudo-scrofulous or rachitic children who have hereditary syphilis.

BERGER.

PAUL (958, Serum-therapy of *ulcus serpens*) treated several typical pneumococcus ulcers of the cornea with maximal quantities of serum. In cases of moderate severity, the stoppage of the ulcer or its rekindling was dependent on the administration or suspension of large doses. On the whole, cures are more frequent with large quantities of serum. Paul does not overlook the fact that many ulcers get well without serum or the galvano-caustic.

STOEWER (959, *Diplobacillus ulcers*) found among ninety-three cases of infectious diseases of the cornea thirty-two diplobacillus ulcers, *i. e.*, 34 % as compared to 40 % of pneumococcus ulcers. In mixed cases containing both kinds of bacilli the clinical picture was dominated by the latter. He did not take into account slight marginal ulcers. On the day after the traumatism the eye, which usually had already a diplobacillus catarrh, presented a fairly central gray place surrounded by a delicate areola. The injection increases gradually, chemosis,

iritis, and a small hypopyon appear. The ulcer is superficial, the margin frequently slightly elevated, here and there undermined, and sometimes surrounded at some distance by a gray circle. Deposits also appear on Descemet's membrane. The bacteriological examination is not to be omitted in spite of the difference of the clinical picture from that of the pneumococcus ulcer. Only exceptionally is treatment with zinc sulphate sufficient, the galvano-caustic is usually necessary.

HOTTA (960, Infection of the cornea with saliva) made erosions, pockets, and perforating wounds in the cornea of the animals experimented on, and covered them with human saliva, which contained pyogenic streptococci and staphylococci. Infection appeared only in the pocket wounds. He considers the danger of infection from bits of saliva during operations as very slight.

OLIVERES (961, Serum-therapy in ulcers with hypopyon) tried Römer's antipneumococcus serum in three cases of hypopyon keratitis without success, and is inclined to believe it useful only in mild cases.

BERGER.

KASSAS (962, Tincture of iodine in ulcers) applied tincture of iodine to the bases of twenty-one obstinate, atonic corneal ulcers. The ulcers healed quickly, and the cauterization left no scar. The leucoma which remained was proportioned only to the depth of the ulcer. In obstinate cases the cauterization needed to be repeated as many as five times, but twice was sufficient usually.

HIRSCHMANN.

Contusions of the eyeball may produce indirect ruptures, writes FUCHS (963, Small ruptures at the corneo-scleral margin). The eye bursts from within outward at a place distant from that where the blow is received, and lacerations of the cornea are produced over which the conjunctiva remains uninjured, as well as larger lacerations. Fuchs studied in seventeen cases a uniformly peculiar form of rupture of the cornea at the limbus. They were small, 2 to 4mm long, concentric to the margin of the cornea; frequently they form only a little round space in the corneo-scleral margin. They begin at Schlemm's canal and penetrate obliquely forward at the limbus. Usually they are in the upper part. The periphery of the iris becomes incarcerated. The simultaneous internal

injuries to the eye are not usually very severe, aside from laceration of the zonula and of the lens capsule, which sometimes results in cataract. These ruptures of the cornea usually occur in young people, in older people the sclera is more apt to be involved. The prognosis is not bad. The incarcerated iris should be excised.

THOMSON and BUCHANAN (964, *Obstetric injuries*) find injuries of the cornea produced during labor more frequent in Glasgow than in other large cities, and ascribe this frequency to the conformation of the pelvis met with there. They have observed nine cases in addition to the six previously reported by them. They were caused by contracted pelvis, by the pressure of forceps, or by both factors combined. The prognosis depends on whether the *membrana elastica posterior* is involved or not. If not, the cloudiness is temporary; but if it is, a permanent leucoma is produced. The temporary cloudiness is diffuse and due to an *œdema* of the cornea, the permanent is of a linear form. At first the entire cornea appears steamy with striations, then the cloudiness increases sometimes until the cornea is completely opaque and the striations cannot be seen, then follows a gradual decrease of the *œdema* while the striations due to the formation of cicatricial tissue become more and more visible. The influence of the last on the vision is very bad. Years afterward they still cause a high degree of irregular corneal astigmatism, even though they can scarcely be detected by a very careful examination.

DEVEREUX MARSHALL.

The preparation studied by JOHNSTON (965, *Pathology of pterygium*) showed a thick mass of connective tissue covered by three layers of epithelium. The outermost cells were flat with indistinct nuclei. The middle layer was composed of more or less oval cells with round or oval nuclei. The cells next the connective tissue were cylindrical with elongated nuclei. The connective tissue consisted of loose fibres without regular course. The structure thus appeared to be a proliferation of the epithelial and connective-tissue layers of the conjunctiva.

ALLING.

KUGEL (966, *Tattooing*) uses a Graefe knife, or better, a keratome. With this he makes perhaps thirty incisions, 2mm

long, which he fills with India ink. The resultant irritation of the eye is less than after tattooing with needles.

VON HIPPEL (967, *Membrana pupillaris persistens corneæ adhærens*) is a convert to the view that this condition is not the result of an *ulcus corneæ internum*, but of an incomplete separation of the embryonal tissue into two layers.

The eyeball described by FISCHER (968, *Papilloma*) had the entire palpebral fissure overgrown by a papilloma of the conjunctiva and cornea, which prevented perception of light. The microscopic examination showed a cauliflower growth on a normal eyeball, the cornea of which alone was changed in its anterior layers, partly overrun by pannus. The tumor was firmly attached to the limbus and was adherent in places to the conjunctiva. On account of the pannus Fischer believes that an injury received sometime before played a certain part in the etiology of the tumor. Enucleation was performed in this case, but is not usually necessary because of papillomata.

Primary epithelioma rarely or never develops from an uninjured cornea. BRADY (969, *Primary epithelioma of the cornea*) reports a case which first appeared in the upper temporal quadrant. When it was excised there was clear cornea all about it. The epithelium dipped down into the parenchyma, and typical pearl formations were found. Active mitosis was seen in many cells. Diagnosis: papillary epithelioma.

ALLING.

GASPARINI (970, *Primary carcinoma*) gives the clinical history of a case observed by him and the result of the objective examination. The histological examination of a portion confirmed the diagnosis, and after enucleation proved the tumor to be a typical epithelioma which had involved the true corneal tissue.

CIRINCIONE.

MENACHO (971, *Melanosis*) removed a little melanosisarcoma from the limbus of a man forty-one years old. Then little melanosisarcomata multiplied in the neighborhood, and finally pigment spots appeared on the cornea without inflammatory reaction or visible vascular connection with the conjunctival margin. The rest of the eye was normal. Pigmented epibulbar sarcomas are not as malignant as those of the uvea.

STEINER (972, *Pigment spots*) found two cases of pigment

spots on the cornea in Malays, in whom pigment spots of the skin and conjunctiva are more frequently met with than in Europeans. He removed a superficial piece from one and found the pigment beneath the epithelium in the stroma of the cornea as a natural product.

Sections XIII.—XVIII. Reviewed by DR. O. BRECHT,
Stettin.

XIII.—LENS.

- 973. KNAPP, H. The lens capsule in the operation of cataract. *Amer. Jour. of Ophthal.*, Sept., 1905.
- 974. ROCHON-DUVIGNEAUD. Pyramidal cataract. *Soc. d' ophthalmologie de Paris*, Oct. 10, 1905.
- 975. OSTERROTH. Double cataract with tetany. *Deutsche med. Wochenschr.*, 1905, No. 31, p. 1254.
- 976. CAZALIS. The supposed cure of cataract without operation. *Ann. d'oculistique*, cxxxiv., p. 43.
- 977. KUHNT, H. Cataract extraction with contracted conjunctival sac. *Zeitschr. f. Augenheilk.*, xiii., p. 103.
- 978. BLASCHER. Report of 500 cataract extractions. *Ibid.*, p. 780.
- 979. COLLINS, D. J. Notes on a series of operations for the extraction of cataract. *Journal Royal Army Medical Corps*, Feb., 1905.
- 980. SMITH, H. Extraction of cataract in the capsule. *Arch. of Ophthalmology*, xxxiv., 6, p. 601.
- 981. TUERK. Expulsion of the lens nucleus. *Deutsche med. Wochenschr.*, 1905, No. 30, p. 1212.
- 982. HANSELL, H. S. The treatment of infection after cataract extraction. *Annals of Ophthalmology*, April, 1905.
- 983. BERKA, A. Patency of an extraction wound maintained by a plate of epithelium. *Arch. f. Augenheilk.*, liii., p. 42.
- 984. VOGT, ALFRED (Basle). Spontaneous dislocation of the lens as a hereditary disease. *Zeitschr. f. Augenheilk.*, xiv., p. 153.
- 985. VON HIPPEL, EUGEN. Anatomical studies of congenital cataract, together with a new malformation of the lens. *Arch. f. Ophth.*, ix., 3, p. 427.

KNAPP (973, Lens capsule) discusses the best method of avoiding trouble with the capsule in cataract extraction, *i. e.*, entrance of capsule into the wound, adhesions to pupillary edge, and subsequent opacities. The vertical splitting which was done by Graefe years ago is condemned because it does not favor the delivery of the lens and leaves a dense central opacity. When the centre of the capsule is scratched and torn in various directions, as is the custom of some, adhesions are formed, but the complete removal of the central portion

would be ideal except for its inherent danger of dislocation of the cataract. He argues strongly for his well-known peripheric method, which opens the capsule under the iris above the pupillary edge.

ALLING.

ROCHON-DUVIGNEAUD (974, Pyramidal cataract) found the lens capsule wanting at the place of protrusion in a case of this form of cataract. There had been no perforation of the cornea.

BERGER.

OSTERROTII (975, Cataract with tetany) reports the case of a woman forty-five years old who could not go about in consequence of contractures of the muscles of the body and legs and suffered frequently from painful spasms of the muscles of the extremities. Complete opacity had developed in each lens. The thyroid gland was very small. The latter condition plays an important part, because this gland, while healthy, can render harmless the toxine produced by tetany, but, when its function is changed, can no longer prevent nutritive disturbances which, in the eye, are first manifested in the lens.

HORSTMANN.

CAZALIS (976, Non-operative cure of cataract) observed two cases of spontaneous absorption of the soft cortical matter of a cataract. In one the remaining nucleus and capsule had to be removed, because the patient, on account of the central position of the nucleus, could otherwise have useful vision only when the pupil was dilated with atropine. After the operation the vision with the correcting glass was $\frac{5}{20}$.

BERGER.

Cataract extraction may be rendered difficult by contraction of the conjunctiva and a stenosis of the palpebral fissure as the result of trachoma. In such cases KUHNT (977, Cataract extraction with contracted conjunctival sac) performs the subconjunctival operation downward without the use of the speculum. Although the technique is difficult and there are many objections to the method he recommends it in certain cases.

BLASCHKE (978, Report of 500 cataract extractions) gives these results as obtained in his 500 cases. In 374 uncomplicated cases without iridectomy, vision 1-0.3, 80.21%; 0.3-0.1,

13.63%; 0.1- $\frac{1}{100}$, 4.54%; less than $\frac{1}{100}$, 1.6%. In 86 cases without iridectomy, vision 1-0.3, 53.48%; 0.3-0.1, 23.25%; 0.1- $\frac{1}{100}$, 16.27%; less than $\frac{1}{100}$, 6.97%. Choroidal hemorrhage occurred twice, infection twice, irido-cyclitis seven times.

COLLINS (979, Extraction of cataract) reports 36 operations for cataract performed by him on natives of India. Iridectomy was performed in all cases but one, in which the lens escaped in its capsule as soon as the incision was made. Prolapse of the vitreous occurred in six cases. Postoperative irido-cyclitis occurred in four. DEVEREUX MARSHALL.

SMITH (980, Extraction in capsule) reports 2616 cases of cataract on which he operated between May 3, 1904, and May 3, 1905, according to his method of extraction in the capsule. (The method is described in detail in these ARCHIVES for November, 1905.) The results in his 2616 cases were: Iritis in 0.3%, loss of vitreous in 6.8%, laceration of the capsule in 8%, capsule left in the eye in 4.28%, first-class result in 99.27%, second-class result in 0.38%, failure in 0.34%. It should be specially noted that iritis occurred only twice in the 2494 cases in which the capsule was extracted without injury, while it occurred in 55% of the cases in which it remained behind.

TREUTLER.

TUERK (981, Expulsion of lens nucleus) observed a spontaneous expulsion of the lenticular nucleus into the anterior chamber after discussion had been performed on account of a stationary nuclear cataract.

HORSTMANN.

HANSELL (982, Infection after extraction) recommends injections of 1:1000 to 1:3000 solutions of sublimate into the anterior chamber.

ALLING.

BERKA (983, Patency of wound maintained) found, in an eye which had been enucleated on account of irido-cyclitis, that the conjunctival portion of the wound made during an operation six months before had not cicatrized, but remained open to the surface of the conjunctiva. Although infection had not taken place in this case, he considers that it confirms the Leber-Wagenmann theory, that late infection after operations may be due to the entrance of bacteria through such fine cicatrical fistulae.

VOGT (984, Hereditary dislocation of lens) describes the

occurrence of spontaneous luxation of the lens without congenital ectopia or inflammation as a markedly hereditary disease in a certain family. It appeared between the ages of 20 and 65 and affected the men more than the women (50% : 12%). No further heredity through female descendants was shown. In some cases the onset of a fairly rapidly increasing myopia was observed at the beginning of the dislocation. The course was remarkably good in this family: even when glaucoma supervened, the vision usually remained useful without special treatment.

VON HIPPEL (985, New malformation of the lens) observed in the two eyes of a newly born rabbit, in addition to other changes such as coloboma and cataract, a circular prominence on the lens.

XIV.—IRIS.

986. BURNETT, SWAN M. An unusual form of exudate into the anterior chamber in irido-cyclitis after cataract extraction. *Amer. Jour. of Ophthal.*, Aug., 1905.
987. GUTMANN, ADOLF (Berlin). Etiology and statistics of primary iritis. *Deutsche med. Wochenschrift*, 1905, No. 42, p. 1671.
988. GALEZOWSKI, H. Gonorrhœal irido-choroiditis. *Rec. d'ophthalm.*, xxvii., p. 321.
989. SHERER, J. W. A case of voluntary iris. *Jour. Amer. Med. Assn.*, May 6, 1905.
990. JONES, N. C. Congenital inflammatory ectopia of the pupil. *Klin. Monatsbl. f. Augenheilk.*, xliii., 2, p. 583.
991. POLATTI, A. Sulla transfissione dell' iride. *Ann. di Ottalm.*, xxxiv., pp. 757-770.
992. SCIONTI, ORESTE. Contributo allo studio della sinechiotomia anteriore. *La Clinica Oculistica*, April-July, 1905, p. 2102.
993. GALLENGA, C. Contributo allo studio dell' ectropion uveæ e dell' orlo pupillaire. *Archivio di Ottalmol.*, xii., 9 and 10.
994. AYRES, S. C. Double radial rupture of iris. *Amer. Jour. of Ophthal.*, May, 1905.
995. MANZUTTO, C. Some cases of new formation of pigment on the anterior surface of the iris. *Zeitsch. f. Augenheilk.*, xiii., p. 17.
996. COSMETTATOS, GEORGE F. A form of pseudo-coloboma of the iris, or ectropion uveæ congenitum. *Arch. f. Augenheilk.*, liii., p. 186.
997. SILVA, N. Histology of iris pearls. *Klin. Monatsbl. f. Augenh.*, xliii., 2, p. 450.
998. BLASCHEK. A case of serous, traumatic cyst of the iris with rapid growth. *Zeitsch. f. Augenheilk.*, xiii., p. 804.
999. TEICH, MORITZ. Traumatic irido-dialysis (subluxation of the

lens, Fuchs' detachment of the ciliary body and of the choroid, blood pigment beneath the lens capsule). Contribution to the pathological anatomy of rare injuries of the eye. *Arch. f. Augenheilk.*, lii., p. 261.

BURNETT (986, Unusual form of exudate) relates an atypical case of spongy irido-cyclitis. The exudate appeared nine days after extraction in the lower part of the anterior chamber and gradually increased for about a week. The pupil remained wide and the iris of good appearance. On the mass were extravasations of blood which changed daily. The exudate slowly disappeared, leaving a small blocked pupil. He believes the inflammatory process to have been mostly in the ciliary body. The duration of the exudate was exceptionally prolonged. After one failure a second iridotomy gave V = $\frac{1}{100}$.

ALLING.

GUTMANN (987, Etiology of primary iritis) states that of the 150 cases observed in v. Michel's clinic at Berlin 41, or 27%, had tuberculosis, 8, or 5.3%, chronic nephritis, 20 or 13.3%, disturbances of the circulatory apparatus. In 47, 31.3%, the presence of syphilis, including congenital, was more or less probable, in 5, 3.3%, there was gonorrhœa and gonorrhœal rheumatism, in 6, or 4%, a combination of several diseases. Absolutely negative conditions were found in 18, or 12%. In this series the majority of the patients were males.

GALEZOWSKI (988, Gonorrhœal irido-choroiditis) has seen several cases of iritis due to gonorrhœa associated with gonorrhœal rheumatism. The iritis may place the eye in danger by complication with cyclitis or choroiditis. In one case neuro-retinitis developed. Neuritis in consequence of gonococcus infection was first described by Panas and its toxic nature recognized in 1892.

BERGER.

SHERER (989, Voluntary iris) gives a rather imperfect account of a case in which the pupil could be dilated to the maximum voluntarily.

ALLING.

JONES (990, Congenital inflammatory ectopia) reports two cases of inflammatory ectopia of the pupil. He ascribes the displacement of the pupil to an inflammation which took place not in the latest period of intra-uterine life and involved

the upper part of the iris and ciliary body. The cases indicate that ectopia pupillæ rests upon an inflammatory basis.

HORSTMANN.

POLATTI (991, *Transfixion*) briefly reports the clinical histories of some patients operated on by him, with comments. He finds that the operation suggested by Fuchs presents the advantage of a great simplicity in its performance, and as a preparatory operation for iridectomy, when the latter is rendered difficult by the condition of the anterior chamber, transfixion of the iris is reasonably indicated.

CIRINCIONE.

SCIONTI (992, *Operations for anterior synechiæ*) gives the statistics of fifty cases of anterior synechiotomy performed with Piccoli's synechiotome. In eighteen of these patients secondary glaucoma had appeared, and in the majority of these not only was the iris replaced in its normal position, but the glaucoma also was completely and permanently checked with improvement of the vision. In leucoma adhærens the operation is indicated to guard against an endocular infection.

CIRINCIONE.

GALLENGA (993, *Ectropion of the uvea*) reports cases of ectropion of the margin of the pupil of inflammatory origin. He believes that this condition is not due wholly to either of the causes which have been advanced in explanation, retraction of the organic exudate on the anterior surface, and simple atrophy of the stroma of the iris, but rather to a combination of both, and that the active cell proliferation of the constituent parts of the pars iridica retinæ, is also contributory.

CIRINCIONE.

AYRES (994, *Double radial rupture*) describes a case of rupture of the iris caused by a shot from an air-gun. Lying in the coloboma was a mass of iris tissue entirely separated from the iris and its ciliary attachment. This mass later shrivelled up and disappeared under the approaching edges of the iris.

ALLING.

MANZUTTO (995, *New formation of pigment*) observed within a short time four eyes with a new formation of pigment on the anterior surface of the iris. The eyes were all blind and soft. In three, traumatism or an operation had

preceded. It could be stated with certainty that the deposit of pigment was not congenital, but acquired. The author found in literature only six similar cases, five reported by Nettleship and one by Lawford.

COSMETTATOS (996, Pseudo-coloboma) reports two cases of abnormal pigmentation of the iris which simulated the appearance of a coloboma.

SILVA (997, Iris pearls) examined the tissue of the iris in a case in which a so-called iris pearl had developed in consequence of the lodgment in the anterior chamber of a cilium through a perforating wound of the cornea. The iris tissue played only a secondary part, as it furnished nutrition but no fibres to the formation of the wall of the cyst. The hair as such took no part in the formation of the tumor, but was pushed aside as a foreign body by the epithelial cells. The iris showed no sign of proliferation and none of a commencing penetration of the epithelial cells, although these lay directly upon the iris tissue.

HORSTMANN.

IN BLASCHEK's (998, Cyst of the iris) case a cyst of the iris grew in the course of three weeks to a size of 6mm. The patient was a man forty-three years old. The cause was an injury, probably with a bit of iron. The cyst was hollow and lined with several layers of epithelium. The endothelial cells of the vessels were enlarged.

The title of TEICII's (999, Traumatic irido-dialysis) article gives its substance. The case was one of blunt traumatism to an uninjured eyeball.

XV.—CHOROID.

1000. SCHULTZ-ZEHDEN, P. Chronic, disseminated, tuberculous chorio-retinitis. *Zeitschrift f. Augenheilk.*, xiv., p. 213.
1001. VON MICHEL. Metastatic tumor of the choroid in probable Hodgkin's disease. *Zeitschrift f. Augenheilk.*, xiv., p. 421.
1002. PAUL, L. A case of metastatic adeno-carcinoma of the ciliary body. *Arch. f. Augenheilk.*, liii., p. 1.
1003. MARBE. Carcinoma of the choroid. *Deutsche med. Wochenschrift*, 1905, No. 27, p. 1076.
1004. DE SCHWEINITZ, G. E. Concerning melanoma of the choroid, with report of one case of this character and of a pigmented sarcoma of the choroid early in its development. *Ophthalmic Record*, July, 1905. *Trans. Amer. Ophthal. Soc.*, 1905.

1005. SCHIECK, FRANZ. Melanosarcoma of the uvea in its different manifestations. *Arch. f. Ophthalmologie*, Ix., 3, p. 377.
1006. PARSONS, J. H. Early detachment of the retina in sarcoma of the choroid. *Klinische Monatsbl. f. Augenheilk.*, xliii., 2, p. 135.
1007. JOHNSTONE, R. H. Diffuse leucosarcoma of the choroid. *Ophth. Record*, April, 1905.
1008. TERRIEN, F., and COUTELA, CH. Neoplasms and pseudo-neoplasms in an atrophic globe. *Arch. d'ophthal.*, xxv., p. 641.
1009. WAGNER, PAUL. Intraocular tumors. *Zeitsch. f. Augenh.*, xiv., p. 533.
1010. LANDMANN, OTTO. A case of symmetrical congenital absence of choroid and retina except in the macular area. *ARCH. OF OPHTHALM.*, XXXIV., 5, p. 473.
1011. SCHULTZ-ZEHDEN, P. Very small sarcoma of the choroid. *Klin. Monatsbl. f. Augenheilk.*, xliii., 2, p. 150.

SCHULTZ-ZEHDEN (1000, Tuberculous chorio-retinitis) examined the eye of a man seventy-three years old, who had died of catarrhal inflammation of the lungs and in whom he had found shortly before death a large patch of choroiditis, together with several small ones, just below the left papilla. Although the general autopsy revealed no tuberculosis, yet the choroidal disease proved beyond a doubt tuberculous. In consideration of von Michel's views regarding the tuberculous nature of choroiditis, the author thinks that the diagnosis of chronic, disseminated, tuberculous chorio-retinitis cannot be determined positively by a general examination.

While metastatic carcinomata of the uvea from a primary tumor of the mamma are not uncommon they are rare when the primary seat of the disease is in the stomach, liver, pleura, or prostate, and hitherto only one has been recorded in which a choroidal metastasis came from a mediastinal tumor. VON MICHEL (1001, Metastatic tumor of the choroid) reports a second case. The patient was a man 42 years old who presented the symptoms of Hodgkin's disease. The right eye was enucleated and in it was found an intra- and extrabulbar carcinoma. The primary carcinoma was found in the anterior mediastinal space.

PUAL (1002, Metastatic adeno-carcinoma) saw a metastatic adeno-carcinoma of the ciliary body in the right eye of a man 66 years old who had suffered for two years and finally died of carcinoma of the stomach.

MARBE (1003, Carcinoma) reports the case of a woman 40 years old who had had a nodular tumor (adenoma) removed from the right breast. Six months later a flat, solid tumor appeared in the right choroid, followed soon by a similar one in the left. Still later tumor nodules could be felt in the bones of the pelvis and in the abdomen, while the cachexia increased. Autopsy could not be obtained. Forty-six cases of carcinoma of the choroid have been described of which a third were bilateral.

The first case of DE SCHWEINITZ (1004, Melanoma) was a negro who died of fibro-sarcoma of the brain. The eye showed swelling of the nerve head and densely pigmented choroid. Near the disk was an area of thickened choroid 1.2mm by 0.5mm in size with accompanying inflammatory signs. The patch was formed of thickly massed pigment cells. The ferro-cyadin hydrochloric acid test showed presence of iron in two groups of cells. The other patient died of epithelioma of the dura. The choroid throughout was deeply pigmented, and 5mm from the centre of the nerve was a pigmented thickening of the choroid measuring 4.4mm in diameter by 0.9mm in thickness which proved to be a melanosarcoma. There was reaction for iron in the cells at the periphery. Both growths originated in the layer of larger blood-vessels.

ALLING.

SCHIECK (1005, Melanosarcoma) is of Ribbert's view regarding intraocular sarcoma and the inadequacy of the present classification. He considers the first stage of a melanosarcoma to be a non-pigmented round-celled sarcoma, the second a non-pigmented spindle-celled sarcoma, and the third a pigmented spindle-celled sarcoma. The designations hitherto used cannot be considered as names of different varieties of sarcoma, but only of transient stages of one and the same form of tumor, the melanosarcoma.

PARSONS (1006, Early retinal detachment in sarcoma) says that in all cases of apparently uncomplicated detachment of the retina it is of the greatest importance to search carefully for a tumor by a thorough investigation of the field and an exhaustive ophthalmoscopic examination with the pupil dilated to its utmost.

HORSTMANN.

JOHNSTONE (1007, Diffuse leucosarcoma) describes a flat, non-pigmented sarcoma which involved nearly half the choroid. The tumor was composed of large and small round and spindle cells.

ALLING.

TERRIEN and COUTELA (1008, Tumor in phthisical globe) observed the appearance of a lymphosarcoma of the choroid in an eye which had undergone phthisis some weeks after birth. The patient was $3\frac{1}{2}$ years old. In literature there are only a few unexceptionable cases of the formation of a sarcoma in an atrophic globe to be found; usually a doubt remains whether the phthisis bulbi was in consequence of the sarcoma of the choroid, or whether the sarcoma had developed in an already atrophic eye.

BERGER.

WAGNER (1009, Intraocular tumors) reports several interesting intraocular tumors. One was a circumpapillary sarcoma, the development of which could be observed, three were diffuse, cup-shaped sarcomata of the choroid, and one was a præcorneal tumor. He also adds a benign adenoma of the ciliary process.

LANDMANN (1010, Absence of choroid and retina) found in a patient 44 years old with externally normal globes vision reduced to $\frac{1}{3}$ and the visual field contracted nearly to the fixation point on each side. The ophthalmoscopic examination revealed a pale optic nerve with imperfectly developed central vessels, the white sclera occupying the entire fundus. No choroidal vessels could be seen. In the right eye three, in the left two, groups of vénæ vorticosæ were visible into which a plexus of macular vessels emptied. The macula lutea was not supplied by the central vessels. Landmann believes that this was a case of arrested development of the choroid and retina through embryologic obliteration of the posterior long, and partially of the posterior short, ciliary arteries, with the exception of the branch which supplied the macular plexus.

ABELSDORFF.

SCHULTZ-ZEHDEN (1011, Very small sarcoma of the choroid) found in a cadaver a spindle-celled sarcoma of the choroid in the region of the posterior pole, which had a diameter of 2mm. It originated in the layer of large vessels and extended

toward the suprachoroidea. The pigmented stroma cells formed the matrix of the tumor.

HORSTMANN.

XVI.—VITREOUS.

1012. GREEFF, RICHARD. Studies in regard to the pathology of the vitreous fibrillæ. *Archiv f. Augenheilk.*, liii., p. 119.

GREEFF (1012, Studies in regard to the pathology of the vitreous fibrillæ) describes the normal and fluid condition, the fibrillary degeneration, the detachment and the regeneration of the vitreous and concludes that vitreous fibrillæ are unchangeable after they have become fully formed. They can neither retrograde, nor advance, nor divide. There is no regeneration of the fibrillæ, the vitreous fluid alone may be abstracted. Hence there does not exist a fibrillary degeneration of the vitreous which presupposes division and increase of the fibrils. This is to be distinguished from the so-called organization of the vitreous which comes chiefly from the retinal and choroidal vessels. The only change to which they may be subjected is dissolution from disturbances of nutrition in the region of the corpus ciliare and orbiculus ciliaris.

XVII.—GLAUCOMA.

1013. HIRSCHBERG, J., and GINSBERG, S. A case of tuberculous glaucoma. *Centralblatt f. prakt. Augenheilk.*, xxix., p. 321.

1014. SCHOUTE. Glaucoma in the five years 1900 to 1905. *Verhandl. des 10 hollaend. Naturf. u. Aerztecongr.*, 1905, Abth. Augenheilkunde.

1015. GREEN, J., Jr. Juvenile glaucoma simplex associated with myasthenia gastrica et intestinalis. *Amer. Jour. of Ophthalmology*, Oct., 1905.

1016. URIBE Y TRONCOSO. The filtration of the eye and its part in the pathogeny of glaucoma. *Annales d'oculistique*, cxxxiv., p. 250.

1017. BRAND, EMIL. A case of traumatic glaucoma. *Centralbl. f. prakt. Augenheilkunde*, xxix., p. 275.

1018. WICHERKIEWICZ. Iridectomy for glaucoma and massage of the eye. *Annales d'oculistique*, cxxxiv., p. 132.

1019. DE VRIES. Closure of the filtration angle in glaucoma. *Verhandl. d. 10 hollaend. Naturf. u. Aerztecongr.*, 1905, Abth. Augenheilkunde.

1020. MORETTI, E. Glaucoma secondario a lussazione spontanea cristallino congenitalmente ectopico. *Annales di Ottalm.*, xxxiv., p. 703.

1021. BARTELS, MAX. The blood-vessels of the eye in glaucoma, and experimental glaucoma produced by obstruction of the anterior blood channels. *Zeitschrift f. Augenheilk.*, xiv., pp. 103, 258, and 458.
1022. SEELIGSOHN, W. Hydropthalmus with cartilaginous formation within the eye, ectropium uvae, and pigmentation of the retina from the vitreous space. *Arch. f. Augenheilk.*, liii., p. 21.
1023. SCHNABEL. The development of the glaucomatous excavation. *Zeitschrift f. Augenheilk.*, xiv., 1, p. 1.
1024. SCHOEN. Hydropthalmos, glaucoma, and iridectomy. *Centralbl. f. prakt. Augenheilk.*, xxix., p. 289.

HIRSCHBERG and GINSBERG (1013, Tuberculous glaucoma) report a case in which the excised piece of iris proved to be tuberculous. It consisted of granulation tissue, poor in vessels, composed of epitheloid cells, which contained giant cells and exhibited considerable nuclear degeneration. No tubercle bacilli were demonstrated.

According to SCHOUTE (1014, Glaucoma in the five years 1900 to 1905) glaucoma is equally prevalent in all lands. The most prominent symptom is the increase in tension. This is still best tested by means of the finger as a perfectly satisfactory tonometer has not yet been invented. The mydriasis has nothing to do with the hypertony, yet the use of mydriatics must be condemned, except perhaps immediately after an operation for glaucoma. It is noteworthy that pilocarpine sometimes produces mydriasis. Myotics should always be employed when there is an increase of tension. The best result is often sought in the increase of the depth of the anterior chamber. According to many authors the contraction of the pupil and of the muscle of accommodation opens the network of the ligamentum pectinatum and the sinus venosus of the sclera, which is of clinical significance since Goldzieher has described glaucomatous iritis. The ligamentum pectinatum may be occluded by fibrin, exudate, or leucocytes. Glaucoma without increase of tension occurs though frequently confounded with atrophy of the optic nerve. The excavation of the papilla is not always a consequence of hypertony. According to Schnabel cavities are formed by atrophy in the optic nerve which coalesce and produce the excavation. As regards treatment most ophthalmologists operate in glaucoma simplex. When it is possible to obtain some result with myotics the eye nevertheless

gradually loses its power of resistance. No decision can yet be given in regard to resection of the sympathetic nerve.

JITTA.

GREEN (1015, Juvenile glaucoma simplex associated with myasthenia gastrica et intestinalis) suggests habitual constipation as possible explanation of a case of glaucoma simplex in a woman of thirty, especially as there was notable improvement in the ocular condition immediately following the establishment of normal intestinal function. ALLING.

URIBE Y TRONCOSO (1016, Filtration of the eye in glaucoma) holds a different view from Leber regarding the filtration of the eye. The differences between the findings of the two authors may perhaps be explained by the fact that Leber made his investigations on pigs' eyes while this author experimented on the eyes of men. When Leber objected to Uribe y Troncoso's theory of glaucoma that an increase of albumin is present in eyes with hypertony he did not show that the high proportion of albumin in the eye was the cause of the glaucoma. A hypertony exists at the beginning of an iridocyclitis, but in its later course the afferent nutritive channels are narrowed so that the onset of hypertony is prevented in spite of an increased secretion of albumin. The glaucoma may be the result of the preponderance of the intraocular tension in the posterior section of the eyeball over that of the anterior section, the increase of the volume of the vitreous, and the disturbances of the nutritive osmotic processes in consequence of a "dialbuminose" through the diseased vessels of the choroid and retina. BERGER.

BRAND (1017, Traumatic glaucoma) saw inflammatory glaucoma follow an injury to the cornea by a bit of iron. The patient was a man thirty years old. The author suggests that a slight glaucomatous condition of the eye may frequently be the occasion of the formation of corneal vesicles after injuries.

WICHERKIEWICZ (1018, Iridectomy and massage) considers anterior sclerotomy useful only in glaucoma simplex. In inflammatory glaucoma it is not important whether the coloboma of the iris be made large or small, but it must extend to the periphery. By massage the cicatrization may be

prevented from taking place too quickly so that a filtration scar will be left. Mixtures of eserine-pilocarpine with the addition of cocaine are more effective in glaucoma than solutions of eserine and pilocarpine alone. In several cases in which both of these myotics had been used without effect the instillation of a mixture of the two produced better results.

BERGER.

DE VRIES (1019, Closure of filtration angle) has tried to maintain an opinion in regard to the origin of the closure of the filtration angle by the investigation of a series of glaucomatous eyes. He examined twenty-four eyes with increased tension in all of which he found the filtration angle obliterated, although the manner and extent of the obliteration were not always the same. His conclusions were: 1. Inflammatory abnormalities may be demonstrated in glaucoma like occlusions of the filtration angle. 2. The glaucomatous occlusion of the filtration angle may occur and yet no cause be found which, acting on the posterior surface of the iris, presses the base of the iris forward.

JITTA.

The case observed by MORETTI (1020, Glaucoma secondario a lussazione spontanea cristallino congenitalmente ectopico) was that of a woman, thirty-four years of age, who had complained of fleeting attacks of pain and transient haziness of vision in her right eye, especially during the day when at work in the field. After some months this condition grew worse without known cause, the pain became unbearable and constant, the vision became almost lost. When the patient came to the hospital the right eye was very prominent and exhibited extremely severe signs of glaucoma. The lens was in the anterior chamber with its anterior surface against the posterior surface of the cornea. In the left eye the lens was subluxated. The lens of the right eye was extracted with slight loss of vitreous. After some hours it was found that a serious intraocular hemorrhage had caused the prolapse of a good part of the iris. This was excised and a secondary operation performed. The eyeball was preserved though in a condition of hypotony.

CIRINCIONE.

BARTELS (1021, Blood-vessels in glaucoma) describes the anatomical relations of the blood-vessels of the eye, with

criticisms of the findings of other authors. He says that vascular diseases are very frequent in glaucomatous eyes, yet they do not usually exceed the limits of arteriosclerotic changes and have nothing characteristic of glaucoma. There are in primary glaucoma inflammatory vascular changes in the anterior segment of the globe and in the central vessels of the optic nerve, yet it is undetermined whether there are no exceptions. The changes found in the intrascleral portion of the anterior ciliary arteries and the dilatations of the posterior ciliary arteries were very striking to the author. He then describes his attempt to produce glaucoma experimentally on rabbits and dogs. He found that in these animals the obstruction of the excretory passages by ligation of the muscles and conjunctiva with an intact filtration angle brought about a long lasting complex of symptoms which resembled those of glaucoma.

SEELIGSOHN's (1022, *Hydrophthalmos with cartilaginous formation within the eye, ectropium uveæ, and pigmentation of the retina from the vitreous space*) interesting article, the substance of which is given in the title, is the fourth on the rare occurrence of pigmentation of the retina from the vitreous space or from the ciliary body, the other three being those of Schweigger, v. Hippel, and Knapp.

SCHNABEL (1023, *Excavation*) advances further evidence in favor of his theory that glaucoma begins with the formation of cavities in the nerve fibres of the papilla in consequence of destruction and absorption of the nerve fibres. Through shrinkage of the connective-tissue walls an empty space is formed in front of the lamina intrascleralis into which the retina can be dislocated, and a space behind the lamina into which the lamina can enter.

SCHOEN (1024, *Hydrophthalmos, glaucoma, and iridectomy*) claims that when it is too late for iridectomy in a case of glaucoma a corneo-scleral incision should be made, its cicatrization prevented, and a conjunctival bleb produced.

XVIII.—SYMPATHETIC OPHTHALMIA.

1025. BRUECKNER, A. Clinical observations. II. Sympathetic ophthalmia. *Arch. f. Augenheilk.*, lii., p. 424.

1026. THEOBALD, S. The pathogenesis of sympathetic ophthalmia. *Jour. Amer. Med. Assn.*, Jan. 28, 1905.

1027. WEEKS, J. E. Operations on the primarily and on the secondarily diseased eye in sympathetic ophthalmia. *Ibid.*, Jan. 28, 1905.

1028. VEASEY, C. A. Clinical and histological remarks regarding sympathetic ophthalmia. *Ibid.*, Jan. 28, 1905.

1029. WUERDEMANN, H. V. Sympathetic ophthalmitis after panophthalmitis. *Ophthalmic Record*, Nov., 1905.

1030. ZUR NEDDEN. Bacteriological investigations of the blood in sympathetic ophthalmia and other forms of irido-choroiditis. *Arch. f. Ophthal.*, lxii., 2, p. 193.

BRUECKNER (1025, Sympathetic ophthalmia, clinical observations) reports a case of sympathetic ophthalmia which occurred ten years after the receipt of the injury and recovered with preservation of the full function of the eye.

THEOBALD (1026, Pathogenesis) defends the theory of the ciliary nerves as the cause of sympathetic ophthalmia. It is based, in his opinion, on the investigations by Head and Campbell regarding herpes zoster, which showed that inflammations of the skin may be produced by a high degree of irritation of the ganglion cells without the intervention of micro-organisms or trauma.

ALLING.

WEEKS (1027, Operative treatment) gives four clinical histories which confirm the observation that a marked tendency to the formation of plastic exudates persists after the disappearance of the inflammatory symptoms, and that this contra-indicates surgical intervention because increased tension will render the complete loss of the vision probable. The various problems are discussed which arise in the operative treatment of sympathetic ophthalmia.

ALLING.

VEASEY (1028, Clinical and histological remarks) gives his experience with the administration of large doses of sodium salicylate. In two cases inunctions of iodide of potash, etc., had been unable to check the trouble. In the first case the symptoms promptly disappeared after the administration of the salicylic acid; in the second there was a recurrence every time the medication was suspended.

ALLING.

The case reported by WUERDEMANN (1029, Sympathetic ophthalmitis after panophthalmitis) had, in the left eye, traumatic cataract which was extracted. On the third day the eye became infected and the cornea later sloughed. A month after this the other eye was found in a state of

severe sympathetic irido-cyclitis. He has found reported four other cases of like nature, which shows that panophthalmitis, contrary to the rule, may be followed by sympathetic ophthalmia.
ALLING.

ZUR NEDDEN (1030, The blood in sympathetic ophthalmia) was able to produce a plastic inflammation by the injection of the blood of a patient who was suffering from sympathetic ophthalmia into the vitreous of a rabbit and to transmit this again by inoculation to other eyes. Blood which had been passed through Berkefeld's filter did not excite inflammation. He obtained improvement and recovery in a patient with sympathetic ophthalmia after subcutaneous injection of 30ccm. of serum taken from a patient who a short time before had suffered from the same disease. Nedden also obtained from the rabbit's vitreous, after injection of blood from a patient suffering from sympathetic ophthalmia, a bacillus which resembled the pseudo-diphtheria, and this introduced into the blood current produced a severe plastic inflammation, which got well after a time. He was not able to produce this kind of progressive inflammation in the eyes of rabbits from other forms of plastic irido-choroiditis. Therefore he is of the opinion that inflammation producing micro-organisms are present in the blood of patients suffering from sympathetic ophthalmia, although they cannot be detected by the usual methods of investigation. HORSTMANN.

Sections XIX. to XXII. Reviewed by DR. H. MEYER,
Brandenburg.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

- 1031. JOHNSON, W. B. The proof of the existence of amblyopia *ex anopsia*. *Annals of Ophthal.*, July, 1905.
- 1032. BEST, F. A hereditary disease of the macula. *Zeitschr. f. Augenheilkunde*, xiii., p. 199.
- 1033. COSMETTATOS, G. Coloboma of the macula lutea. *Zeitschrift f. Augenheilkunde*, xiv., p. 575.
- 1034. WISSELINK, G. W. A case of traumatic disease of the macula lutea. *Klin. Monatsbl. f. Augenheilk.*, xlili., 2, p. 385.
- 1035. ZIRM, E. A case of permanent extensive change of the two maculae produced by direct sunlight. *Arch. f. Ophth.*, ix., p. 401.
- 1036. GREENWOOD, A. Obstructions in the retinal vessels. *Jour. Amer. Med. Association*, March, 1905.

1037. HESS, C. Pathological anatomy of the papillo-macular bundles of fibres. *Arch. f. Augenh.*, lii., p. 201.
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1039. HARMS, CL. Anatomical studies of vascular diseases in the region of the central artery and vein of the retina. *Arch. f. Ophth.*, lxi., pp. 1 and 245.
1040. BRAUNSTEIN, E. P. Angioneuroses of the retina. *Westn. Ophthalm.*, 1905, 4.
1041. HILLEMANNS and PFALZ. Apoplexia sanguinis retinæ, or the so-called hemorrhagic retinitis after an accident. *Klin. Monatsbl. f. Augenheilk.*, xliv., 2, p. 373.
1042. HAY, PERCIVAL J. Embolism of the central artery of the retina. Retention of normal vision. *Ophthalmoscope*, June, 1905.
1043. HEINRICHSDORFF, P. Disturbances of adaptation and of the visual field in hemeralopia. *Arch. f. Ophth.*, lx., 3, p. 405.
1044. BELOGLASOW, M. M. Hemeralopia. *Westn. Obschteschestw. Hygiene*, etc., 1905, 8.
1045. STUDER, F. Pigmentation of the human retina after optico-ciliary resection. *Arch. f. Augenh.*, liii., p. 206.
1046. STUTZIN, J. Typical pigment degeneration of the retina. *Inaug. Diss.*, Giessen, 1905.
1047. TERRIEN, F., and MONTHUS. An unusual form of retinitis. *Soc. d'ophthalmologie de Paris*, Oct. 10, 1905.
1048. COHN, H. A case of detachment of the retina which remained cured for twenty-five years after operation. *Berl. klin. Wochenschrift*, 1905, No. 51, p. 1584.
1049. SCHERENBERG, K. A case of bilateral detachment of the retina, with increase of tension, associated with albuminuric retinitis of pregnancy. *Klin. Monatsbl. f. Augenheilkunde*, xliv., 2, p. 31.
1050. HANCOCK, W. J. A case of tubercle (?) in the retina. *Royal London Ophthalmic Hospital Reports*, March, 1905.
1051. PARSONS, HERERT J. Early detachment of the retina in cases of sarcoma of the choroid. *Ophthalmic Review*, June, 1905; also *Klin. Monatsbl. f. Augenheilk.*, xliv., 2, p. 135.
1052. OVIO, G. Study of glioma of the retina. *Annali di ottalmologia*, 1905, p. 570.
1053. VISSER, B. P. Determination of the field of vision in monolateral (so-called congenital) amblyopia. Lecture, Amsterdam.

JOHNSON (1031, Amblyopia ex anopsia) saw a case of strabismus convergence in which the vision of the squinting eye had never been better than fingers at six feet. Within fifteen days after the loss of the formerly normal eye the patient recovered perfect vision in the other. Another case after the loss of the better eye improved in the other from $\frac{1}{10}$ to $\frac{1}{8}$.

ALLING.

BEST (1032, Hereditary disease of the macula) had the opportunity to examine fifty-nine members of a family which suffered from hereditary disease, and found in eight a mono-lateral or bilateral affection of the macula. It presented the form of a bright reddish, round, sharply defined patch of retino-choroiditis which had run its course, situated in each in the same place, just below the fixation point. About seven similar cases have been reported. Regarding the cause, an abnormal direction of the ocular fissure and an intra-uterine inflammation were both excluded, so it could be explained only as a fault of development. Consanguinity plays a certain part.

COSMETTATOS (1033, Coloboma of the macula) reports a case of coloboma of the macula associated with paramacular choroiditis, and, on account of the presence of the latter, adopts Deutschmann's theory, which ascribes the origin of coloboma of the macula to an intra-uterine inflammation.

WISSELINK'S (1034, Traumatic disease of the macula) patient, after contusion of both eyes, had an absolute scotoma in the right, which changed into a circular absolute surrounded by a relative scotoma. The innermost portion was sound. In the left eye there were several radiating scotomata. The author explains the scotoma of the right eye by laceration of the outer coats of the eye not involving the retina, that of the left by lacerations of the retina.

ZIRM (1035, Changes in the macula from sunlight) describes a case of blinding by direct sunlight. A boy had looked directly at the sun with both eyes for some minutes, with the result that a grayish-black oval spot of $1\frac{1}{2}$ times the diameter of the papilla, with pigmented margin, was produced in the region of the macula. The vision of each eye was reduced to fingers at 3m. By means of subconjunctival injections of oxycyanate of mercury the vision was improved to fingers at 5m, while the ophthalmoscopic condition remained unchanged. This condition was due to hemorrhages in the region of the macula.

GREENWOOD (1036, Obstructions in the retinal vessels) shows that the majority of the obstructive conditions in the retinal vessels are of true arteriosclerotic nature. At first the ophthalmoscope shows slightly increased and irregular

arterial reflex. The arteries are somewhat tortuous. Congestion is to be seen in the papilla and a downy exudate about the vessels.

ALLING.

HESS (1937) observed on the temporal side of the papilla of a macacus a delicate gray mass which extended toward the fovea and obscured the retina like a veil. He found anatomically at this place a marked increase of the neuroglia nuclei, and lumps of pigment epithelium occupying the retina. The corresponding portion of the retina was adherent to the choroid. The condition corresponded to that of a degeneration of the papillo-macular bundles, and was of special interest because in this case a very early stage of the process came under pathological examination.

VON MICHEL's (1938, Medullated nerve fibres) case of medullated nerve fibres occurred in a patient whose eye had to be removed on account of sarcoma of the ciliary body with partial detachment of the retina. The condition as described agrees with the descriptions given by Manz, Usher, and Mayweg.

On the basis of cases observed by himself and six taken from literature, HARMS (1939, Diseases of the central artery and vein) comes to the following conclusions. A closure of the central artery may occur through thrombosis, without previous proliferation of the intima, as an extension of thrombosis from the carotid, as marantic thrombosis from lowering of the blood pressure, and through disease of the veins. It can also be caused by endarteritis proliferans and by calcareous formations. A closure of the central vein may be due to thrombosis or to disease of its walls. A closure of the vein calls forth symptoms of stasis, but these may be wanting when the heart is very weak and when collateral tracts exist. A thrombotic occlusion of the central vein may be associated with glaucoma. A sharp distinction between embolism of the central artery and thrombosis of the vein is not justified, because both vessels are frequently diseased. Occlusion of one vessel determines a slowing of the current in and thrombotic closure of the other. The secondary thrombotic occlusion may govern the clinical picture, while anatomically the primary occlusion of the first vessel comes to the front. A hemorrhagic infarct, as understood by

Cohnheim, has not been found. The "hemorrhagic infaret" is rather a combination of the clinical pictures of embolism of the central artery and thrombosis of the vein.

BRAUNSTEIN (1040, Angioneurosis) describes fifteen cases of circulatory disturbances in the retinal vessels, all of which he ascribed to vascular spasm. In five of these cases he found reflex spasms in single arterial branches in nervous, exhausted persons; in two, ischaemia of the retina in consequence of weak heart-action after physical overstrain and infectious disease; in two, spasm of the arteria macularis with extravasations in the retina after traumatism; in one, spasm of the retinal arteries together with clonic spasms of the muscles of both eyes in a hysterical, masturbating girl; in three, cloudy vision due to reflex vasomotor disturbances and retinal hemorrhages in women caused by irritation of the genitalia by masturbation and violent coitus. The author suggests that many cases of toxic amblyopia, from poisoning with lead, tobacco, alcohol, iodoform, etc., may at least start as an angioneurosis.

HIRSCHMANN.

HILLEMANNS and PFALZ (1041, Hemorrhagic retinitis after an accident) report a case of hemorrhagic retinitis in which the picture of a serious stasis in the region of the central vein with great loss of vision appeared ten days after the receipt of a considerable contusion of the neighborhood of the right eye. Condition and function were unchanged at the end of four months. Other symptoms indicated the presence of vascular disease at the same time. Ten months later the condition and the vision were again normal. A gradually increasing hemorrhage into the optic-nerve sheath was assumed to be the cause. But the final restoration of vision and of the fundus to normal in spite of the long persistence of the condition after the injury is of interest.

HAY'S (1042, Embolism of central artery) patient was a woman forty-three years old who had aortic and mitral disease. She complained of severe pain in the left supraorbital region. Six years before, the left eye suddenly became blind, but regained normal vision. At this time the vision of each eye was $\frac{1}{2}$. The left field was much contracted. The entire fundus was œdematosus with the exception of the papillo-

macular region about which there were many fairly large hemorrhages. The central artery was narrowed. The fundus gradually regained its normal appearance and the pain disappeared. The macula maintained its entire blood supply from a cilio-retinal artery. Two years later she had a second attack of blindness of the same nature so that perception of light was lost. On the following day the vision was $\frac{1}{2}$, the fundus was normal, the visual field was contracted as before. Inside of three weeks she had regained perfect vision, the same as after the first attack.

DEVEREUX MARSHALL.

According to Piper the sensitiveness of the retina in imperfect illumination increases in normal persons slowly during the first ten minutes, then very rapidly for the next twenty minutes, and then again slowly so that adaptation is complete after from forty to sixty minutes. According to HEINRICHSDORFF (1043, Adaptation and visual field in hemeralopia), in hemeralopia the steep ascent of the curve is delayed or done away with. The time of adaptation is almost the same as the normal and only in acute cases is the time of doubling exceeded. The ring scotoma is not a rare, or accidental, but rather the typical disturbance of the visual field for all true forms of hemeralopia dependent on a lesion of the rods. It is therefore demonstrable in both slight and severe cases, so long as the periphery is preserved. The concentric contraction occurs secondarily in the severe cases.

BELOGLASOW (1044, Hemeralopia) draws the following conclusions from the observation of 635 idiopathic cases together with the statistics of 36,807 registered cases. The greatest number occur between the ages of twenty and twenty-five years, in the spring, in years with very low barometric pressure, great trouble, and low temperature. Direct dependence on bad harvests was not demonstrable. The ideas that it is due to general weakness, hunger, lack of fat in the food, or a special microbe, he found incorrect. The fact that hemeralopia often occurs in those who are engaged in ploughing, digging, or handling manure causes the author to suggest the hypothesis that hemeralopia may be a disease or neurosis of intoxication produced by the products of decomposition of organic material. Diminished air pressure, more water in the soil, breaking up of the soil or of manure, favor the escape

of these products into the air and the importation of them into human bodies.

HIRSCHMANN.

STUDER (1045, Pigmentation of retina after optico-ciliary resection) had the opportunity to examine anatomically an eye which had been enucleated three weeks after optico-ciliary resection. On the temporal side there was atrophy of the retina with proliferation of pigment, with increase in the sclera of Langerhans cells. These conditions were to be ascribed etiologically to the division of the left ciliary arteries. The lumpy pigmentation of the retina was due to emigration of the pigment epithelium which was changed into a phagocytic form and took up a part of the neighboring cells.

STUTZIN (1046, Pigment degeneration of the retina) has collated the cases of typical pigment degeneration of the retina met with in Giessen, forty-six out of 53,000 patients, and has considered particularly consanguinity and heredity and the relations to glaucoma.

TERRIEN and MONTHUS (1047, Form of retinitis) demonstrated a case of retinitis with a stellate figure and slight oedema of the papilla, in the neighborhood of which were several yellowish white patches as broad as a fourth of the diameter of the papilla. In the periphery spots of the same kind were present, but fewer in number. They suppose this to have been a case of disease related to retinitis circinata.

COHN (1048, Detachment of the retina cured for twenty-three years) reported the case of a myope in whom two attacks of retinal detachment occurred. Both were treated by scleral puncture and the cure obtained in one had remained permanent for twenty-three years.

SCHERENBERG (1049, Retinal detachment with increase of tension and albuminuric retinitis of pregnancy) has observed a case of this nature which terminated fatally, and another which was complicated by cerebral symptoms. He considers the involvement of the retina to be a very unfavorable prognostic symptom and he therefore recommends as early an interruption of the pregnancy as possible.

HANCOCK (1050, Tubercl (?) in the retina) described the case of a healthy man nineteen years old who had neither acquired syphilis nor suffered from hereditary disease. To

the temporal side of the papilla in the region of the macula was a yellowish patch with indistinct margins 1.5 mm high. There were other spots in the neighborhood. The retinal veins were dilated, tortuous, and partially covered by oedema. Vision - counting of fingers. The eye was divergent. The condition did not improve so the eye was enucleated. The choroid was normal. There were two well defined foci of granulations in the retina which was detached from the choroid by an exudate, folded and thickened. The inner focus lay in the layer of nerve fibres and was composed of connective tissue with giant cells. The outer focus lay in the layer of rods and cones, and the external granular layer contained blood-vessels and proliferated pigment epithelium, but no giant cells. No tubercle bacilli were found. The eye was hardened in formol.

DEVEREUX MARSHALL.

PARSONS (1051, Early detachment in sarcoma of the choroid) was surprised at the frequency with which retinal detachment was met with in commencing cases of sarcoma of the choroid. The retina is simply pushed forward over the tumor and detached only to a slight degree in its neighborhood, yet frequently there is an extensive detachment in the lower part of the fundus. When the tumor is situated in the upper part of the fundus it is separated from the detachment by a portion of undetached retina, if it is situated further down the one detachment may pass over into the other. This isolated detachment is only the first stage of the total which eventually appears. He described eight cases in which this condition was present and gave drawings of five.

This detachment disconnected from the tumor is the result of a secretion of fluid from the choroid. The tumor acts as an irritating or foreign body so that more fluid than normal escapes from the vessels, sinks downward, and produces the detachment. The fluid is not normal lymph, but contains much albumin and resembles instead the blood plasma. The obstruction of, and the pathological changes in, the vessels causes an exudate of the albuminous constituents of the blood. The author considers it of the utmost importance that in all cases of apparently simple detachment of the retina a careful search should be made for the presence of

a tumor, not only with the ophthalmoscope, but also by the exact determination of the visual field and examination by oblique illumination through a dilated pupil.

DEVEREUX MARSHALL.

Ovio (1052, *Glioma*) gives an anatomical description of a series of eyes with glioma of the retina. In five out of seven cases the tumor had spread to the optic nerve and in three the diffusion of the neoplasm into the nerve could be recognized microscopically. Ovio is of the opinion that the optic nerve is the path of predilection for the spreading of the retinal tumors.

Five of the tumors examined by the author belonged to the type of the exophytic gliomas, one to the endophyte, and one to a mixed type.

As regards the method of transmission of the glioma to the optic nerve, Ovio is convinced that both the connective-tissue septa and the bundles of nerve fibres furnish paths for the proliferation of the neoplastic elements into the optic nerve. As regards the question from what retinal elements the glioma takes its origin, the author does not believe that it depends upon a contingent invagination of the retina.

The author presents several characteristics, obtained from five eyes enucleated on account of glioma of the retina, to assist in the differential diagnosis between many lesions of the eye and glioma, but he acknowledges that errors cannot always be avoided.

CIRINCIONE.

In monolateral amblyopia, whether congenital or acquired, Heine found a central scotoma in 90 per cent. of his cases. This is not the common view. Heine used the method of complementary colors which Schlosser considered the best practical method of examination of the field. VISSER (1053) has found this method not perfectly accurate and has used the stereoscopic method recently recommended by Haitz, by which he made at the same time control observations. Although the results obtained from his twenty-three cases did not perfectly agree with those obtained by Heine yet he believes that they are of the same tenor. The best vision in which Visser found a central scotoma was $\frac{1}{10}$, while the positive results increased as the vision diminished. JITTA.

XX.—OPTIC NERVE.

1054. ASK, F. Two cases of coloboma of the optic nerve. *Zeitschr. f. Augenheilkunde*, xiii., p. 432.
1055. STOELTING, B. Diseases of the optic nerve due to vascular atheroma. *Klin. Monatsbl. f. Augenheilkunde*, xliii., 2, p. 113.
1056. SHOEMAKER, W. T. Binasal hemianopsia. A case of neuritic atrophy with hemianopic defects of the fields. *New York Medical Journal*, Feb., 1905.
1057. PHIL, ALB. A case of monolateral retrobulbar neuritis in recurrent empyema of the antrum. *Klin. Monatsbl. f. Augenh.*, xliii., 2, p. 50.
1058. ADDARIO, C. Clinical and experimental observations in regard to optic atrophy in facial erysipelas. *Archivio di Ottalm.*, xii., Nos. 1-2.
1059. DE LIETO VOLLARO AGOSTINO. Contributo allo studio delle alterazioni del nervo ottico e delle sue guaine nella meningite purulenta cerebrospinale. *Archivio di Ottalmologia*, vol. xii., Nos. 1-2.
1060. ALT, A. Notes on a case of gumma of the optic nerve. *Amer. Jour. of Ophthalmology*, July, 1905.
1061. MAYON, M. S. Intradural tumor of the optic nerve. Neurofibromatosus. *Royal London Ophthalmic Hospital Reports*, vol. xvi., part 2.
1062. GOLOWIN, S. Tumors of the optic nerve and their operative treatment. Part 2. *Westn. Ophthalm.*, 1905, 5.
1063. SANTUCCI, S. J. Endothelioma of the optic nerve. *Annali di Ottalmologia*, 1905, pp. 618-629.
1064. PALERMO, C. Toxic retrobulbar neuritis. *Ibid.*, Nos. 5-8.

ASK (1054, Coloboma) discusses the question of colobomata of the optic nerve. According to Elschnig both the coloboma and the conus are situated below the optic nerve. The conus is not to be explained, like the coloboma, as a remains of the foetal optic cleft but as the result of stretching of the membranes of the eye in the lower part of the globe, which is itself referable to faulty development. Case 1 was probably one of true coloboma of the optic nerve which had been enlarged secondarily by tension, but in the second case the evidence that it was a true coloboma was weaker.

STOELTING (1055, Diseases due to atheroma) reports cases which he has observed of disease of the optic nerve due to atheroma of the vessels. He gives as the characteristic picture a very slowly increasing neuritis with great swelling of the papilla, resembling choked disk. Later there is a concentric contraction of the field with fluctuations of vision

not explained by the ophthalmoscopic findings, direct impairment of vision by bodily exertions, and very persistent paralysis of the abducens with which there is a great tendency to fusion of the double images. Off and on there can be seen a loss of the normal soft rounding of the vessels. The paresis of the abducens is explained by the position of the nerve in the cavernous sinus.

It is generally accepted that the non-decussating bundles of the optic nerve mingle with other fibres in the chiasm in such a way that it is difficult to imagine a lesion which, situated bilaterally, could produce a purely nasal hemianopsia. SHOEMAKER (1056, Binasal hemianopsia) points out that such defects of the fields are usually caused by affections of the optic nerves. He reports a case of optic atrophy which had binasal hemianopic fields of a very uncommon variety.

ALLING.

PiHL (1057, Neuritis with empyema of the antrum) observed a case of retrobulbar neuritis dependent on a recurrent empyema of the antrum of Highmore in which an improvement of the neuritis each time followed improvement of the empyema by operative procedures. He mentions the numerous relations between diseases of the eye and of the nose and discusses the question why an infection of the conjunctiva may take place from the nasal mucous membrane, but not the reverse. The explanation given is that the cylindric epithelium of the conjunctiva affords more favorable conditions for the development of an infection than the ciliated epithelium of the nasal mucous membrane.

From the observation of two cases in which it was clinically certain that the atrophy was not preceded by inflammation of the papilla, and from experiments with injections of streptococcus and staphylococcus toxin, ADDARIO (1058, Atrophy in facial erysipelas) concludes that the injury to the optic nerve can be ascribed to a thrombophlebitis localized in the posterior branches of the veins of the nerve so that the optic atrophy is to be explained as a descending process of degeneration.

CIRINCIONE.

DE LIETO VOLLARO AGOSTINO (1059, The entrance of pyogenic cocci into the optic nerve) determined in five cases that the pyogenic cocci did not enter the optic nerve from the men-

inges along the sheath, although they could be found in great numbers in the exudate about the chiasm and about the intracranial portion of the nerve. He finds the explanation of this in the presence of an intensive occluding infiltration of the nerve at the point of its passage through the bony canal, which is formed at an early date and so closes the lymph channels. The possibility of the entrance of micro-organisms through the sheath of the optic nerve is not excluded, but the author thinks its occurrence to be exceptional.

CIRINCIONE.

According to ALT (1060, *Gumma of the optic nerve*) gumma of the optic nerve has never been described. He found such a tumor about one-half an inch in front of the chiasm. It was of the size of a pea and the diagnosis was established by microscopic examination.

ALLING.

MAYON's case (1061, *Intradural tumor*) was that of a girl five years old who had at the first examination a convergent strabismus of the right eye and a slight exophthalmos of the left eye with loss of vision. The ocular movements were normal, the pupils reacted only consensually. The optic nerve was atrophic, the arteries small, the veins much dilated. The left eye was more hypermetropic than the right. After the orbit had been opened a large round tumor could be felt wedged in the apex of the orbit. There was a piece of the optic nerve $\frac{1}{2}cm$ long between the tumor and the globe. The nerve was divided as closely as possible to the optic foramen and then separated from the globe. The latter was replaced. A high degree of exophthalmos followed that caused ulceration of the cornea which recovered. At first there was complete ptosis, the cornea was anaesthetic, and the eye movements were restricted. Most of these symptoms disappeared to a certain degree. The tumor was spindle-shaped, $2.5cm$ long, $1.8cm$ broad, and the central end of the optic nerve was twice as thick as the peripheral. The tumor lay entirely in the dural sheath. On the surface of the tumor were the long ciliary nerve and artery, on its posterior surface a part of the oculomotorius. The division of these nerves could not be avoided because the tumor was so wedged in the apex of the orbit. Microscopically the tumor was found to be totally encapsulated in the dural sheath which was not infiltrated, although dis-

tended. The tumor consisted of two parts separated by a delicate membrane which probably originated from the pial sheath, a lower, through which the optic nerve ran, and an upper in which the optic nerve was not involved. The nerve fibres were much degenerated, although Marchi's method gave negative results, probably in consequence of the long duration of the degeneration (seven months). Blood-vessels were scarce but normal and usually provided with endothelial and perithelial rings. The article is illustrated by eight microphotographs.

DEVEREUX MARSHALL.

GOLOWIN (1062, Operative treatment of tumors) describes very fully five cases of tumors of the optic nerve. Three were subdural or intradural, two were extradural. The latter were apple-shaped with a platter-shaped depression fitted to the eye, and originated from the outer nerve sheath. The three subdural tumors were sausage-shaped or pyriform. Different parts of the same tumor showed very different construction. In all three cases the inflammatory symptoms were subdural with marked involvement of the arachnoid. In places there was considerable lymph stasis. The first case was diagnosed as a fibrosarcoma myxomatodes springing from the arachnoid; the nerve trunk was hyperplastic and oedematous. Another case was glioma teleangiectodes, the other glioma.

All the peculiarities of these cases are easily explainable when the preparations are interpreted as fibromatosis or elephantiasis of the optic nerve. The inflammatory symptoms mentioned in the subdural tumors the author considers real and primary and advances the conjecture that they were called forth by a hitherto unknown irritant (bacteria or toxin) localized in the subdural space. The inflammation produced adhesions between the membranes of the sheath, lymph stasis, interference with the nutrition of the nerve, and hyperplasia of the tissue of the type of elephantiasis.

HIRSCHMANN.

SANTUCCI (1063, Endothelioma) gives the clinical history of a case observed by himself. The retrobulbar tumor was extirpated with the aid of Kroenlein's operation together with the optic nerve with which it formed a mass at the en-

trance of the latter into the orbit. Histologically the tumor had a honeycomb structure and was composed of elements of an endothelial character. The endothelium of the pial sheath of the optic nerve appeared to be the starting-point of the neoplasm.

CIRINCIONE.

PALERMO (1064, Toxic retrobulbar neuritis) was unable to detect any changes due to intoxication with santonin in his experiments to produce toxic neuritis by the anatomical examination of the optic tracts. In poisoning with aniline oil and iodoform there was a proliferation of nuclei of the connective-tissue elements. On the contrary a serious destruction of nerve fibres is produced by intoxication with true male fern followed by complete atrophy of the optic nerve. Palermo agrees with Nuel that male fern occasions a parenchymatous retrobulbar neuritis. A clinical observation made by him he considers further evidence of the parenchymatous nature of retrobulbar neuritis due to poisoning with male fern. In retrobulbar neuritis due to poisoning with tobacco and alcohol, the primary change seems to be in the nerve elements. In the early stages of the latter form of neuritis the author has used successfully two to five drops daily of a 1% solution of pilocarpine hydrochlorate internally.

CIRINICONE.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

1065. KEEPER, G. J. Tine of a steel fork thrust through the left upper eyelid and eyeball and through the antrum of Highmore. Therein for fourteen years. Removal. No reaction. *Ophth. Record*, Sept., 1905.

1066. CAUSE, F. The pathogenesis of traumatic orbital diseases. *Arch. f. Augenheilkunde*, liii., p. 313.

1067. REIS, W. A case of panophthalmitis with abscess of the brain and fatal meningitis. *Arch. f. Augenheilkunde*, liii., p. 160.

1068. LOHMANN, W. Commotio retinæ and the mechanics of indirect injuries after contusion of the eyeball. (Commotio retinæ, rupture of the choroid and sclera.) *Arch. f. Ophth.*, lxii., 2, p. 227.

1069. BRAND, E. A case of traumatic glaucoma. *Centralblatt f. Augenheilkunde*, xxix., p. 275.

1070. FRIDENBERG, P. Fibrillary œdema of the retina after contusion. *Arch. f. Augenheilkunde*, lii., p. 296.

1071. COPPEZ, H. Rapport sur les symptômes oculaires de la névrose traumatique. *Société Belge d'ophtalmologie*, June 11, 1905.

1072. BIRCH-HIRSCHFELD, A., and MELTZER. Traumatic enophthalmos. *Arch. f. Augenheilkunde*, lii., p. 344.
1073. ONKEN. Late diagnosis of traumatic detachment of the retina. *Zeitschrift f. Augenheilkunde*, xiv., p. 165.
1074. COSMETTATOS, G. F. Abolition of the light reflex with preservation of the reflex to accommodation of traumatic origin. *Archives d'ophtalmologie*, xxv., p. 664.
1075. LAQUEUR. Bits of glass as foreign bodies in the lens. *Arch. f. Augenheilkunde*, liii., p. 97.
1076. HIRSCHBERG, J. Magnet operation in children. *Centralblatt f. Augenheilkunde*, xxix., p. 265.
1077. TREU, E. A case of echinococcus of the orbit. *Arch. f. Aug.*, liii., p. 171.

After the removal of the piece of metal KEEPER (1065, Removal of the tine of a steel fork) could pass a probe through the lid, phthisical eyeball, and into the antrum.

ALLING.

CAUSE (1066, Traumatic orbital diseases) reports one case of emphysema of the orbit, one of retrobulbar hemorrhage, and one of traumatic enophthalmos. For the first two forms of disease he recommends puncture with a long canula in the fornix of the conjunctiva, and explains the etiology of the latter thus: By a contusion of the orbital region all the bands of fascia are torn and frequently the margin of the orbit is fractured; this produces a hemorrhage which is usually absorbed, but may cause an inflammatory reaction.

REIS (1067, Panophthalmitis with abscess of the brain, and fatal results) describes an injury to the eye which resulted in panophthalmitis with consecutive abscess of the brain and fatal meningitis. The treatment was conservative and the formation of the abscess probably took place rapidly in the beginning of the disease.

LOHMANN (1068, Commotio retinæ) explains the occurrence of commotio retinæ as the result of a counter-distention of the tissue under the influence of the compressed fluids. The opacity produced is due to the escape of fluid from the retinal vessels. The frequently observed disproportion between the visual disturbance and the opacity he ascribes to the fact that in the former, peripheral scotoma and lowering of vision occur first, and last but a short time. The indirect injuries contrary to the direction of the force are similar to the fracture of the

base of the skull. Yet the anatomical peculiarities of the separate membranes are to be taken into account with the factor of counter-distention, particularly the circular course of the fibres at the place of rupture of the sclera.

BRAND (1069, Traumatic glaucoma) observed an attack of glaucoma after an injury with a foreign body which recurred frequently, caused contraction of the visual field, and was checked by iridectomy. He questions whether a slight glaucomatous condition of the eye is not frequently the cause of the formation of blebs of the cornea after injury, a condition which was marked in this case.

FRIDENBERG's (1070, Fibrillary oedema of the retina after contusion) patient had a striated fibrillary oedema radiating in the neighborhood of the macula after a contusion of the eye. He considers the condition analogous to the traumatic swelling with subsequent sclerosis of the lens fibres, and an example of surface oedema (Berlin's opacity).

In his exhaustive elaboration of the eye symptoms of traumatic neurosis COPPEZ (1071, Eye symptoms of traumatic neurosis) comes to the conclusion that the latter designation should be abandoned because the symptoms are partly those of hysteria, partly those of neurasthenia. BERGER.

BIRCH-HIRSCHFELD and MELTZER (1072, Traumatic enophthalmos) report four cases of this nature. One was complicated from the first with pulsating exophthalmos, in the others enophthalmos appeared some days or weeks after the injury. The clinical picture was governed by the fracture of the lower wall of the orbit. The known cases of traumatic enophthalmos are mentioned and the various theories of its causation reviewed. Neither Gessner's theory of contraction, nor Nieden's of atrophy of the fatty tissue, nor the lesion of the bands of fascia which unite the eyeball with the margin of the orbit, nor the neurotic theory affords an explanation satisfactory in all cases. This may yet be obtained with the help of radiography.

ONKEN (1073, Traumatic detachment of the retina) reports a case of traumatic detachment of the retina which took place four weeks after a contusion of the eye.

COSMETTATOS (1074, Abolition of the light reflex with

preservation of the reflex to accommodation of traumatic origin) reports a case in which mydriasis, luxation of the lens, and absence of the light reflex of the pupil followed a traumatism while the reaction of the pupil to accommodation was preserved. Cosmettatos assumes that in this case there was an injury of the fibres of the iris which respond to the light reflex, while those which respond to accommodation were uninjured.

LAQUEUR (1075, Glass in the lens) pictures two cases of injuries of the lens by bits of glass. Opacity of the lens appeared in one three and one-quarter years, in the other some months after the injury as the result of the chemical decomposition of the glass.

HIRSCHBERG (1076, Magnet operation in children) reports five cases of this nature. Four, in which the injury was fresh, were cured with preservation of good vision. In three the lenses were badly injured, became opaque, and had to be removed. In the fifth case many previous attempts had been made to remove the foreign body. Degeneration of the eyeball had begun so that it had to be enucleated.

TREU (1077, Echinococcus) extirpated, with the aid of Kroenlein's operation, eight echinococcus cysts which lay in the orbit behind the eyeball. The eyeball had been luxated by a forcible examination and secured in its new position by the proliferating cysts.

XXII.—OCULAR DISTURBANCES IN GENERAL DISEASE.

1078. BURNETT, SWAN M. Inflammation of the eye due to the toxins of the gonococcus. *Jour. Amer. Med. Assoc.*, Dec. 23, 1905.

1079. BULL, C. S. Certain forms of ocular tuberculosis. *Medical Record*, Dec. 9, 1905.

1080. SNOW, I. Eye symptoms of infantile scurvy. Case of infantile scurvy with extreme protrusion of the right eyeball, shown by autopsy to be due to a large hematoma. *Archives of Pediatrics*, Aug., 1905.

1081. CONNER, L. Is keratitis ever caused by rheumatism? *Journal Amer. Med. Assoc.*, Aug. 5, 1905.

1082. AMBIALET. Cranio-cerebral deformation. Troubles of the visual apparatus. *Annales d'oculistique*, cxxxiv., p. 321.

1083. STEPHENSON, SYDNEY. Congenital word-blindness. *Lancet*, Sept. 17, 1905.

1084. ROCHON-DUVIGNEAUD. Blindness without ophthalmoscopic

- lesions from ventricular hydrocephalus following cerebro-spinal meningitis. *Société d'ophthalmologie de Paris*, Oct. 10, 1905.
1085. BERTOZZI, A. Il senso cromatico e luminoso in alcune malattie del sistema nervoso. *Ann. di Ottalm.*, xxxiv., p. 655.
1086. WEIRLI, E. The histological basis of the so-called cortical blindness, and the localization of the cortical visual centre, of the macula lutea, and the projection of the retina on the cortex of the occipital lobe. *Arch. f. Ophth.*, lxii., 1, p. 286.
1087. CARLINI. Hysterical intermittent mydriasis. *La clinica oculistica*, Sept., 1905, p. 2177.
1088. SCHWAB, S. T., and GREEN, J., Jr. A case of cerebro-spinal rhinorrhœa with retinal changes. *Amer. Journ. Med. Sciences*, May, 1905.
1089. KERRY, RICHARD. A case of acromegaly. *Ophthalmic Review*, July, 1905.
1090. DE LAPERSONNE, F. Acromegaly and bitemporal hemianopsia. *Archives d'ophthalmologie*, xxv., p. 457.
1091. PAGENSTECHER, H. Fundus changes in general diseases, particularly in anaemic conditions. *Arch. f. Augenheilkunde*, lii., p. 237.
1092. DAVIS, A. E. Eye symptoms in cerebro-spinal meningitis. *Med. News*, April 8, 1900.
1093. SHUMWAY, E. A. The association of optic neuritis with facial paralysis. *Journ. Amer. Med. Assoc.*, Feb. 11, 1905.
1094. FISH, M. The connection between diseases of the accessory sinuses and internal diseases of the eye. *Arch. f. Augenheilk.*, lii., p. 275.
1095. PAUNZ, M. Eye diseases caused by nasal diseases. *Arch. f. Augenheilkunde*, liii., p. 367.
1096. HOBHOUSE, EDMUND. Renal retinitis in a child of six and a half with interstitial nephritis. *Ophthalmoscope*, April, 1905.
1097. CARPENTER, GEORGE. Albuminuric retinitis in a case of parenchymatous nephritis in a child. *Ophthalmoscope*, April, 1905.
1098. ULLMANN, G. Vibratory winking of the lids and renal affections. *Académie des Sciences*, Paris, Sept. 11, 1905.
1099. BALLANTYNE, ARTHUR J. The neuritic form of albuminuric retinitis. *Ophthalmoscope*, April, 1905.
1100. BICHELONNE, H. Unilateral mydriasis at the beginning of pulmonary tuberculosis. *Annales d'oculistique*, cxxxiv., p. 273.
1101. BULSON, A. E. Coffee amblyopia. *Amer. Journ. of Ophthalmol.*, Feb., 1905.
1102. ROOSA, D. B. ST. JOHN. Two cases of recovery from toxic amblyopia. *Post-Graduate*, April, 1905.
1103. GALEZOWSKI, JEAN. Toxic amblyopia from copper. *Recueil d'oph.*, xxvii., p. 592.
1104. BERGER, E., and LOEWY, ROBERT. Ocular troubles of genital origin in woman. Paris, Felix Alcan, 1905.
1105. ELIASBERG, M. A case of Tay-Sachs's amaurotic family idiocy. *Zeitschrift f. Augenheilkunde*, xiii., p. 553.

BURNETT (1078, Inflammation due to toxins of the gonococcus) points out the importance to the general practitioner and genito-urinary surgeon of recognizing the well-known form of iritis which occurs in connection with attacks of gonorrhœal rheumatism and which is due to the entrance into the blood, of the gonococcus or its toxin. He cites a case of marked muco-purulent conjunctivitis which he believes was of endogenous origin, as it occurred in a patient with gonorrhœa, and there were gonococci found in the discharge.

ALLING.

BULL (1079, Ocular tuberculosis) believes that ocular tuberculosis is probably never a primary disease. He has found tuberculin of value in diagnosis but as a method of treatment it has proved of little use.

ALLING.

From personal experience, answers to questions by prominent oculists, and study of literature CONNER (1081, Rheumatic keratitis) concludes that, although corneal disease due to rheumatism is a rare affection, it nevertheless occurs. No special type of keratitis can be called rheumatic as it may assume various forms. In general the substantia propria is most frequently affected.

ALLING.

AMBIALET (1082, Cranio-cerebral deformation) reports two cases of oxycephalus caused by compression of the head. In both cases no disturbance of vision was noticed during life. No abnormalities were found in the meninges on autopsy, although in his recent work Patry ascribes the optic neuritis of oxycephalus to a chronic meningitis which causes simultaneously the disease of the optic nerve and the malformation of the skull. The visual disturbance in oxycephalus cannot be explained by compression, because artificial compression can be carried to a high degree without producing injurious consequences. The theory of a contraction of the optic canal as the result of the restricted growth of the base of the skull has much to be said in its favor. As regards the theory of a chronic meningitis of the base of the skull the cause of the meningitis has not yet been discovered.

BERGER.

STEPHENSON (1083, Congenital word-blindness) adds two new ones to the growing list of cases of word-blindness. The first patient was an intelligent boy nine years of age who

experienced great difficulty in learning to read and write. After six months of special instruction he made a marked advance. The second patient was a ten-year-old boy who presented the same set of symptoms. The author emphasizes the fact that this congenital word-blindness is not rare and that by suitable instruction these cases can almost always be greatly benefited.

DEVEREUX MARSHALL.

ROCHON-DUVIGNEAUD (1084, Blindness following cerebro-spinal meningitis) observed a bilateral blindness with normal ophthalmoscopic conditions in a child four years old during an attack of cerebro-spinal meningitis. At the autopsy the ventricles of the brain were found greatly distended from hydrocephalus internus. The author thinks the blindness was caused by compression of the chiasm. BERGER.

BERTOZZI (1085, Color and light sense in nervous diseases) has investigated the color and light sense in a series of cases: of epilepsy, early dementia, etc., by the use of Chibret's chromato-photoptometer, Holmgren's wools, and an apparatus with rotating disks. The field for white and colors was taken in each patient with Landolt's perimeter. His conclusions are: In epilepsy and progressive paralysis the fields for white and for colors are constant and regularly contracted. In neurasthenia the field for white is always contracted, the fields for colors irregularly contracted in many cases. The light sense was normal in the great majority of cases. In hysteria the field for white was frequently normal, frequently contracted. The fields were contracted variously for the different colors, frequently that for green extended beyond the normal. CIRINCIONE.

WEIRLI (1086, Cortical disturbances of vision) seeks to show by a case which he observed clinically and pathologically and by the literature on the subject that purely cortical lesions associated with hemianopic disturbances of vision have not been observed nor described, and that therefore all positive conclusions from purely cortical disturbances as to the localization of the visual centre, the island-shaped cortical representation of the macula, and the projection of the retina lack a firm basis; that, on the contrary, v. Monakow's idea of non-insulated maintenance of the macula is by far the best.

and not contradicted by anatomical and physiological facts. The original must be read for the details.

CARLINI (1087, Hysterical intermittent mydriasis) observed a case of this nature dependent on spasm of the dilator of the pupil in a woman twenty-six years old. The patient was also suffering from inflammation of the bronchial alveoli, so mydriasis from irritation of the sympathetic must also be thought of.

CIRINCIONE.

In 1899 St. Clair Thompson collated twenty reported cases of escape of the cerebro-spinal fluid from the nose. In eight of these there was a more or less marked inflammation and atrophy of the optic nerve. SCHWAB and GREEN (1088, Cerebro-spinal rhinorrhœa with retinal changes) have collated ten more cases, including one of their own, in which various disturbances of the eye have been observed. In all there was either inflammation of the optic nerve or post-neuritic atrophy. The pupils were usually dilated, the visual fields contracted, and the vision much lowered, except in two cases. In four cases the vision was more reduced on the side of the nasal flow. In seven cases a deterioration of vision preceded the nasal flow. The case reported by the authors was one of a woman thirty-two years old who was congenitally very neuropathetic. For two years she had had a flow of clear, tasteless water from the nose, varying in quantity between a few drops and 4cc an hour. Four years before the flow from the nose began, her vision failed and a neuro-retinitis was diagnosticated. Examination of the fluid revealed the characteristics of cerebro-spinal fluid. According to the reported cases, the onset of ocular disturbance may be regarded rather as an accident.

ALLING.

KERRY's (1089, Acromegaly) patient was a man fifty years old who suffered from rheumatism and severe headache. Two years before, optic atrophy had been diagnosed, but after treatment in an institution his vision, according to his own statement, had been completely restored. Examination revealed optic atrophy on the left side, and a less degree of atrophy on the right. Vision - $\frac{1}{2}$. Only a slight improvement was obtained from thyroid extract and the substance of the pineal gland. The entire clinical picture was that of

acromegaly. The most recent views regarding this interesting disease were brought forward. DEVEREUX MARSHALL.

DE LAPERSONNE (1090, *Acromegaly and bitemporal hemianopsia*) describes a case of acromegaly in a woman forty-nine years old in which radioscopy showed a marked enlargement of the sella turcica. There was a divergent strabismus of the right eye, bitemporal hemianopsia with peripheral contraction of the field, and slight paleness of the nasal half of the papilla. The author thinks that a careful examination of the visual field in acromegaly will show the very frequent occurrence of bitemporal scotomata. The bundles of fibres which supply the macula are first involved at a relatively very late period and therefore the disturbance of the central vision appears in advanced cases.

BERGER.

PAGENSTECHER's (1091, *Fundus changes*) work contains first a report of three cases of severe chlorosis from which he concludes, on the basis of the results obtained by lumbar puncture, that the choked disk and optic neuritis found in chlorosis are to be ascribed to the increased intracranial pressure. Then the clinical histories of some patients with hemorrhage from ulcer and abortion are given. The retinal hemorrhages in these cases he ascribes not to sudden reduction of the blood pressure, but to nutritive disturbances caused by the anaemia. He gives the same explanation of the retinal hemorrhages which occur in malaria and hemophilia. Retinal hemorrhages are the direct consequence of the hemorrhagic diathesis and are to be ascribed to the condition of the blood.

DAVIS (1092, *Cerebro-spinal meningitis*) enumerates as motor disturbances which complicate cerebro-spinal meningitis paralyses, conjugate deviation, and nystagmus. Optic neuritis, neuroretinitis, optic atrophy, plastic and suppurative choroiditis, panophthalmitis, keratitis, and conjunctivitis are complications which, particularly the lesions of the fundus, render the prognosis extremely bad. He says that 66 per cent. of such cases die, while of the uncomplicated cases 50 per cent. are fatal.

ALLING.

SHUMWAY (1093, *Optic neuritis and facial paralysis*) finds only eight cases in which optic neuritis was complicated with facial paralysis. Rheumatism or a form of infection may be

considered the etiological factor. The neuritis is usually retrobulbar. With the facial paralysis there may be a flattening of the face and enophthalmos, which is dependent on a trigeminal affection and not on involvement of sensory fibres in the facial.

ALLING.

FISH (1094, Diseases of the accessory sinuses and of the eye) reports a number of cases in which he claims to have demonstrated the connection between uveitis and sinusitis frontalis. He recommends investigation of the accessory sinuses in all cases of iritis, cyclitis, and choroiditis. Probing of the naso-frontal duct always brings the desired therapeutic result.

PAUNZ (1095, Nasal and eye diseases) pictures the anatomical relations between the orbit and the accessory sinuses. In several cases the relations between dacryocystitis, orbital phlegmon, and diseases of the uveal tract and diseases of the accessory sinuses are made plain with the application of appropriate treatment to the nose. Finally, he describes a case in which panophthalmitis, orbital phlegmon, and death followed extraction of cataract in a patient with empyema of the antrum. He therefore recommends examination of the accessory sinuses before operation.

HOBHOUSE's (1096, Renal retinitis in a child) patient was a girl six and one-half years old who had had scarlet fever three and one-half years before. Some time later she began to have headaches and shortly afterward was attacked with convulsions which seemed to be of cerebral origin. She had a neuroretinitis. The urine contained blood. She had persistent vomiting for twelve days before her death. The kidneys were found to be extraordinarily small and atrophic. The chief interest of the case lies in the fact that the symptoms indicated a cerebral much more than a renal origin.

DEVEREUX MARSHALL.

CARPENTER'S (1097, Albuminuric retinitis in a child) patient was a girl ten years old who was taken sick in June, 1885, and had pains in her head and abdomen. When first examined, in November, 1885, there was blood in her urine, the pulse was hard, the heart hypertrophic, and she had a high degree of neuroretinitis in both eyes with hemorrhages. The vessels were embedded partially in a mass of exudate in

which the macula appeared as a white spot. The urine contained albumin, blood, and casts. The urine was small in quantity. In April, 1886, oedema appeared about the ankles. At this time the urine contained a great quantity of albumin and she soon after died. The kidneys were large and white, their pelvis and ureters enlarged and thickened.

DEVEREUX MARSHALL.

ULLMAN (1098, Winking and renal affections) has observed in a number of cases of renal disease attacks of clonic blepharospasm lasting up to thirty minutes, which often affected the upper lid alone and frequently were repeated during the day. Usually there was myosis at the same time. He ascribes this to auto-intoxication, which produced symptoms of irritation of the fifth and seventh cranial nerves.

BALLANTYNE (1099, Neuritic form of albuminuric retinitis) describes this condition and reports a case which occurred in a woman fifty-five years old from which he drew the following conclusions:

1. The neuritic form of albuminuric retinitis is rare.
2. It occurs usually in cases which present serious cerebral symptoms that suggest the presence of a cerebral tumor.
3. Probably in most cases other slight retinal changes may now and then be found which indicate the renal origin of the disease.
4. It appears chiefly in cases of advanced chronic interstitial nephritis, but may occur in other forms of renal disease.
5. The disease of the nerve is probably of the same sort as that in choked disk due to intracranial disease and like it is to be ascribed to increased intracranial pressure.
6. The prognosis is grave as the disease is usually soon fatal.

DEVEREUX MARSHALL.

BICHELONNE (1100, Unilateral mydriasis at the beginning of pulmonary tuberculosis) describes a case of spastic mydriasis and widening of the palpebral fissure on the right side at the commencement of tuberculosis of the apex of the lung. He ascribes both symptoms to irritation of the sympathetic fibres in their course in the rami communicantes, or in their union with the inferior cervical ganglion, by the pressure of a swollen lymphatic gland. He finds the pupils are unequal

in one-seventh of the cases of beginning tuberculosis of the lungs and considers this symptom to be of great diagnostic significance when syphilis and nerve diseases are excluded. Pernot found unilateral mydriasis in one-seventeenth, Deherain in one-forty-second, Destree in 97 per cent. (?) of the cases of pulmonary tuberculosis.

BERGER.

BULSON (1101, *Coffee amblyopia*) describes the result of an experiment made on himself to determine the eye symptoms due to excessive drinking of coffee. For two weeks he drank daily twelve cups of fairly strong coffee, but then had to stop on account of sleeplessness and digestive troubles. Asthenopia and finally amblyopia were produced. The fields were concentrically contracted without scotomata. Two cases in his practice presented reduced vision with contracted fields, one with a central scotoma.

ALLING.

ROOSA (1102, *Recovery from toxic amblyopia*) saw a case of total blindness after intoxication probably with brandy. Ophthalmoscopically the optic nerve presented nothing pathological. Under treatment with strychnine the vision rose in [the course of a month to $\frac{1}{2}$]. The question arises whether in any way methyl alcohol had been substituted for pure alcohol. No report is given of a later determination of the vision which would have given desirable information in regard to the permanency of the recovery. A second case of toxic amblyopia which was treated with strychnine, developed a marked attack of mania an hour after one injection.

ALLING.

GALEZOWSKI (1103, *Amblyopia from copper*) observed bilateral amblyopia in a man fifty-seven years old whose fundus was normal. The vision of the right eye was $\frac{1}{6}$; in the left there was a central scotoma. He ascribed this amblyopia to chronic poisoning with copper, which also caused the gastralgia from which the patient was suffering.

BERGER.

The exhaustive monograph of BERGER and LOEWY (1104, *Ocular troubles of genital origin in women*) on the relations of eye diseases to the normal and pathological conditions of the female sexual organs undertakes to investigate this field from the standpoint of the new works on general

pathology and bacteriology. The visual disturbances which occur with normal menstruation are first described, then those which are met with during puberty, in dysmenorrhœa, amenorrhœa, suppression of the menses, and at the menopause. The visual disturbances occur:

1. Through reflex action.
2. Through toxic action (menstrual auto-intoxication).
3. Through circulatory disturbances.
4. With concomitant symptoms from the gastro-intestinal tract (*e. g.*, menstrual icterus).
5. Through aggravations of neuroses during menstruation.
6. Through aggravations of pre-existing eye diseases during menstruation.

The cause of menstrual auto-intoxication they consider to be a hypersecretion of the inner secretion (Brown-Séquard) of the ovary during ovulation, and the condition is manifested by general and local symptoms. Among the general are enumerated cerebral, spinal, and vasomotor symptoms, such as headache and hypertension. This auto-intoxication can produce the following symptoms in the eye during normal menstruation: inflammatory oedema of the lids, chemosis of the conjunctiva, and hemorrhages into the conjunctiva and into the eye. When the toxic substances are not removed, or are insufficiently removed, because of imperfect menstruation, forms of conjunctivitis, intraocular hemorrhages, perhaps iritis, irido-choroiditis, and diseases of the optic nerve are produced which are with difficulty amenable to treatment. The central scotoma and the irregular sector-shaped contraction of the field, which the authors found, indicate the toxic nature of these diseases of the optic nerve. The sector-shaped toxæmic contraction of the field may assume various irregular forms and may present the picture of a hemianopsia, which has been erroneously ascribed to a vicarious cerebral hemorrhage, when with no other cerebral symptoms. In individual cases paralysis of the eye muscles has been observed, which could be explained by a peripheral, toxic neuritis.

The next chapter deals with the visual symptoms in ovarian insufficiency (chlorosis, castration), in which symptoms appear which may perhaps be explained by the prevalence of the internal secretion of the thyroid. The authors observed a

very interesting case of Dercum's disease, with very marked hysterical visual symptoms, which strengthens the theory of the etiological analogy of the symmetrical tumors of this disease with the "œdème bleu hystérique" of Charcot adopted by some writers.

The chapter on visual disturbances during pregnancy is very exhaustive. The intraocular hemorrhages, paresis of accommodation, optic neuritis, retrobulbar neuritis, and the rare cases of paralysis of the eye muscles met with in this condition are ascribed to an auto-intoxication. Special sections are devoted to uræmic amaurosis and albuminuric retinitis. Then follow the visual disturbances during labor, the puerperium, and lactation, with the dangers of labor to the eye of the child. A case of injury to the cornea by forceps which resulted in infantile glaucoma is described.

Special sections are devoted to septic diseases of the eye from affections of the female genital organs and to visual disturbances which result from uterine hemorrhages. The latter are divided into three groups:

1. Those which occur immediately after the loss of blood, due to the anæmia of the retina.

2. Those due to infection (de Lapersonne).

3. A great many cases in which they are due to an auto-intoxication from the non-excretion of products of metabolism, occasioned by the diminished quantity of blood. Berger recommended in 1892 injections of defibrinated blood as a prophylaxis. In 1894, Terson recommended injections of blood serum, which Berger used with a good result in a case of amaurosis from loss of blood. Berger and Loewy recommend not to wait for the appearance of amaurosis in cases of great loss of blood, but to make these injections at once.

The entire literature, since the works of von Mooren and Salo Cohn in 1890, is appended to each chapter, together with their own experiences.

BERGER.

ELIASBERG (1905, Amaurotic family idiocy) adds another case of the Tay-Sachs amaurotic family idiocy to the seventeen already published. A Jewess seven months old presented the typical picture of this rare disease. The observation was purely clinical, without anatomical findings.

ARCHIVES OF OPHTHALMOLOGY.

EPITHELIAL INCLUSION CYSTS OF THE CONJUNCTIVA.*

BY DR. EDWARD L. OATMAN, BROOKLYN, N. Y.,

SURGEON TO THE MANHATTAN EYE, EAR, AND THROAT HOSPITAL, NEW YORK CITY.†

(With five photographs on Text-Plate IX.)

WITHIN the past few years I have occasionally examined epithelial-lined cysts which have appeared on the conjunctiva after the expression operation for trachoma. Evidently they had developed from epithelial cells which had been excluded from communication with the surface, either by adhesive occlusion at the mouth of a conjunctival crypt, or by approximation and agglutination of conjunctival folds. Formerly, cysts of the conjunctiva were rare, but since the introduction of expression for trachoma they have been observed with comparative frequency. A particularly good example of such a cyst was sent for examination to the laboratory of the New York Post-Graduate Hospital by Dr. E. M. ALGER who also supplied the following history:

The patient, a boy twelve years of age, underwent the operation of trachoma expression at some hospital in this city. Three months later he first came under Dr. Alger's care at the New York Dispensary. On the conjunctival transition fold of the lower lid was a tense, semi-translucent

* Read before the New York Academy of Medicine, Section on Ophthalmology, January 21, 1907.

† From the Pathological Laboratory of the New York Post-Graduate Medical School and Hospital.

cyst, about the size of a split pea. The cyst was opened and a clear fluid evacuated. It soon re-formed and was then thoroughly excised.

Microscopic Examination showed the specimen to be a serous cyst. Its walls were made up of loose fibrous connective tissue, covered externally and lined internally with epithelium of conjunctival origin (Fig. 1). The epithelial cells which covered the outer or conjunctival surface were young, actively proliferating, and closely packed in superimposed layers. Goblet cells distended with mucin were very numerous (Fig. 2). The cells which lined the cyst were histologically identical with those on the conjunctival surface, but differed from them in that they were older, fewer in numbers, and less coherent. The superficial layers of cells were more or less degenerated and were being cast off into the cavity of the cyst. The cyst contents were composed of a slightly albuminous fluid, degenerated epithelium, and cellular detritus (Fig. 3).

The mechanism by which these cysts are formed undoubtedly varies, but the essential feature is *the segregation of some cells from the surface epithelium by inclusion in the substantia propria of the conjunctiva*. This is brought about by special conditions, an ideal one being the operation of trachoma expression. When the conjunctiva is inflamed, the concomitant swelling of the substantia propria and subconjunctival connective tissue serves to increase the depth of the conjunctival crypts and furrows and to bring the surfaces of conjunctival folds into apposition (Fig. 4). It is, however, improbable that these apposed folds will grow together so long as they retain their epithelial covering. For this reason, cases of even severe conjunctivitis are not usually followed by adhesions, unless superficial necrosis has occurred and the epithelium been cast off with the slough. The traumatic conjunctivitis which follows expression differs anatomically from the conjunctivitis of infection. The squeezing and stripping to which the conjunctiva is subjected during

Illustrating Dr. Oatman's Article on "Epithelial Inclusion Cysts of the Conjunctiva."



FIG. 1.—Epithelial inclusion cyst of cyst of conjunctiva.

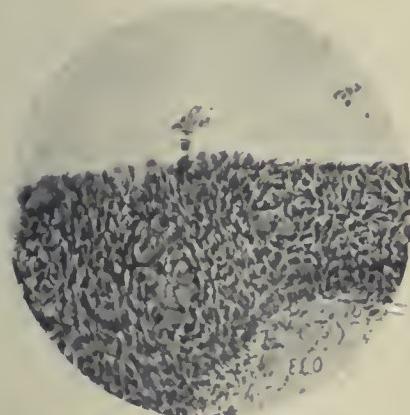


FIG. 2.—Epithelial covering of cyst.

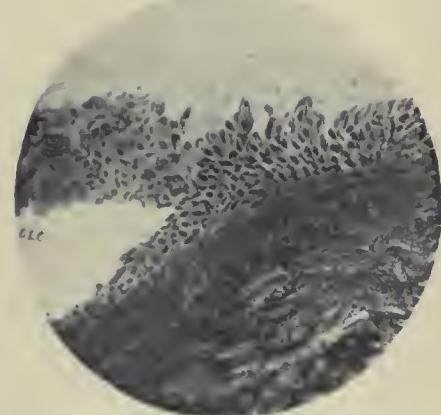


FIG. 3.—Epithelial lining of cyst.

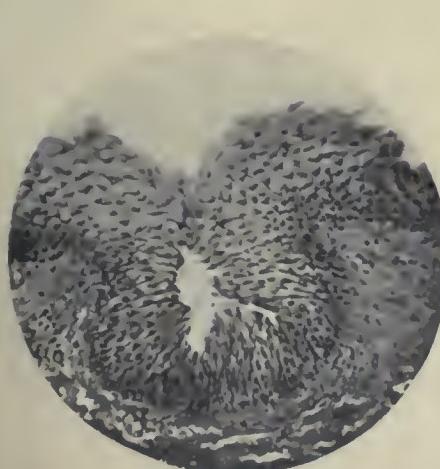


FIG. 4.—Approximation of conjunctival folds

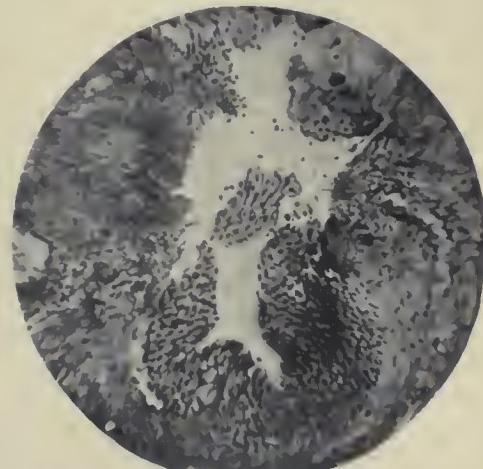


FIG. 5.—Conjunctiva after expression. Union
of the conjunctival folds.

mechanical removal of trachoma granules necessarily tear off irregular patches of epithelium or, if the operation is roughly performed, the membrane itself may be shredded or removed. The swelling which follows the operation throws the surface into deeper folds and brings into contact conjunctival surfaces more or less abraded and denuded of epithelium. If two opposed raw surfaces of these swollen or lacerated folds unite, the epithelial cells still attached to the conjunctiva or lying at the bottom of a crypt and included within the folds will thus be shut off from communication with the surface. Subsequent proliferation and degeneration of such isolated cells will result in cyst formation (Fig. 5). The commendable practice of breaking down the adhesions which follow trachoma expression usually serves to prevent the formation of cysts. These growths are chiefly interesting as a demonstration of one method of cyst formation in the conjunctiva. The treatment is ablation. It will be observed that, in the case of the patient described above, opening the cyst did not effect a cure.

TWO CASES OF KERATITIS DISCIFORMIS.

BY DR. OTTO LANDMAN, TOLEDO, OHIO.

(*With three figures on Text-Plate X.*)

IN 1901, Prof. E. Fuchs described keratitis disciformis in the *Klinische Monatsblätter für Augenheilkunde*. On page 515, he says: "The disease attacks persons in middle life and appears frequently after slight epithelial defects from trauma and herpes corneæ. [Still in 1901 he had collected only twenty-eight cases.] It is characterized by a faint gray disc, which occupied the central area of the cornea and was separated from the transparent cornea by a more intense border. The surface of the cornea over this is dull and insensible. The lesion is in the middle layers of the cornea seldom less superficial. In the course of the disease which generally lasts several months, frequently small ulcerations appear, and there remains a pretty dense opacity." On page 517, he says: "Very often it happens, as Grunert had observed, not only one but two or even three concentric circles may bound the disciform area. The outermost circle seems not to be complete. The disease in the beginning runs a course without irritation, and the patient comes to the doctor on account of visual disturbance. Many cases run this course entirely, whilst others later develop hyperæmia and pain and at the same time the opacity increases in density."

The histories of the cases are as follows:

CASE I.

Feb. 5, 1906.—Chas. Price, aged twenty-six, farmer. He said that the eye felt for three weeks as if something had been in it and yet it did not annoy him much until the last few days. He said that when the eye first began to trouble him he had been sawing wood and that he thought that some sawdust had flown into it.

Stat. Præsens: Lachrymation and photophobia. In the centre of the cornea of the left eye is an opaque disc, limited externally by a very dense narrow ring, and, radiating outward from this, a very delicate halo.

The surface of the disc is somewhat dull and dappled, and the infiltration seems to be in the anterior lamellæ of the cornea. It does not stain with fluorescen. I prescribed atropin and dionin. Two days later a small infiltrate appeared downwards and outwards but very near the light halo; see Fig. 1. A week later two infiltrates appeared above the diseased area; see Fig. 1.

On Apr. 20th, under treatment all irritation had disappeared and the disc had grown slightly thinner.

On Oct. 20th I saw him again when the disc had assumed a kidney shape and the original dense ring was broken up and the opacity was thinner—Fig. 2. The vision was $\frac{1}{4}$. The small infiltrations were scarcely visible.

CASE II.

Oct. 13, 1906.—G. L. M., aged thirty-nine, farmer. Had a very slight simple conjunctivitis of the left eye, which gradually yielded to treatment.

On Nov. 10th, about a week after he had recovered from the conjunctivitis, he struck the left side of his head just at the outer edge of the orbit.

On Nov. 12th a disciform infiltration appeared in the central part of the cornea in its deeper layers. The area *did not stain* with fluorescen and was dull and stippled. A few days later he developed the most intense pain in the region supplied by the supraorbital and the nasal branches of the first division of the ophthalmic. There was ciliary injection and some

tenderness. The pain was greater at night and all of these same symptoms continued for a period of three and one-half weeks. Analgesics, salol, and quinin were tried without effect. Leeches gave no relief. Quinin was continued and finally the pain disappeared.

On Dec. 3d, the third week of the disease, I first noticed a change in the appearance of the cornea: a narrow encircling ring of infiltration made its appearance and the picture was like Fig. 3.

This ring then was *consecutive* to the first disciform infiltration. There was also at this time *insensibility* of the area covered by the infiltration. There were three zones, an inner or very dense area, a second outer less dense, a clear zone, and then the dense ring whose two ends blended and became confluent with the second zone—Fig. 3.

On Dec. 17th the case was discharged—an opacity remaining, however. The vision was $\frac{1}{15}$. Atropin and dionin were continued with the hope of clearing up the opacity.

In the two cases cited, the first was characterized by an absence of irritation, whilst the second was emphasized by great irritation, by ciliary injection and pain, intense photophobia and neuralgia of the supraorbital and nasal branches of the first division of the trigeminus.

When the causes in these two cases are considered, we get but an uncertain history of trauma in the first instance, and in the second, the trauma was not to the eye but on the outer edge of the orbit. There was positively no epithelial lesion in either case, because every effort was made to detect any ulceration by very frequent instillations of fluorescen and always with negative results. Both cases presented almost identically the same picture of a central dense zone, next a trifle less dense zone, then the saturated border. This was a dense, narrow, almost perfect ring, limiting the whole, which was in its turn surrounded on all sides by the apparently intact cornea. There was *no tendency to necrosis* of the central portions

Illustrating Dr. Landman's Article on "Keratitis Disciformis."

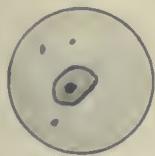


FIG. 1.



FIG. 2.



FIG. 3.

of the infiltration, as has been mentioned and described by others. In the second case there was insensibility of the opaque area. The symptoms of the cases agree almost in toto with the classical picture of this disease drawn by Prof. Fuchs.

Etiology: On page 107 of his original article, Prof. Fuchs says: "Scrapings show nothing positive; several times staphylococci, and in Grunert's case once Morax-Axenfeld-diplobacilli, were found. Generally some slight injury to the cornea; sometimes a herpes zoster or herpes febrialis had preceded the attack."

In the *Klinische Monatsblätter für Augenheilkunde*, October, 1906, Dr. J. Meller reports an histological examination of a case of keratitis disciformis, the only one on record. A consideration of the history of this case shows that neither eye had been normal before this attack of keratitis disciformis; that there was severe iritis; there were deposits on Descemet's membrane; increased tension almost continuously; there had been hemorrhages in the anterior chamber; paracentesis had been performed, and finally the eye was enucleated. The iris showed an intense inflammation; also the ciliary body; hemorrhages in the iris; detachment of the choroid implicating the ciliary body. It seems to me that this eye suffering with so many complications and diseased tissues outside of the cornea would modify any corneal lesion so much that such conclusions as Dr. Meller reached might be questioned as final and correct. It is probably true, however, as he asserts, "that keratitis disciformis is a disease of inflammatory infiltration."

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OCULAR DISTURBANCES DUE TO PRESSURE UPON OR STRETCHING OF THE CERVICO- DORSAL SYMPATHETIC.

BY DR. JOHN DUNN, RICHMOND, VA.

The Spinal Eye.—This term has for several years suggested to my mind a distinct and complete ocular picture, a full description of which has not, so far as I know, found its way into medical literature. At all events, it has not in the minds of oculists generally the diagnostic value it deserves. Three cases will be reported. In all three the visible ocular symptoms were the same. The subjective symptoms varied only in degree, and in the last two the diagnosis of spinal disease, which examination confirmed, was made as soon as the eyes were looked at.

CASE I.

Miss L., aged forty-two, complained that she suffered a great deal from her eyes and from headache—that no glass would allow her to use her eyes as much as she wished. Examination of the eyes showed an abnormally shallow anterior chamber; showed a pupil more contracted than normal, not a “pin-point” pupil, but a pupil sufficiently contracted, in the presence of a shallow anterior chamber and normal tension, to attract notice; showed an apparently convex iris, suggesting to the examining eye that the anterior surface of the lens was bulging. Looked at closely, it could be made out that the inner border of the convexity of the iris did not correspond to the pupillary edge, but was just beyond the sphincter pupillæ. The centre of the lens was, however, nearer the posterior surface of the cornea

than normal. I could make out no abnormality of the commissural fissure, no unusual congestion of the conjunctival structures. Without further examination of the eyes, I asked the patient whether she had ever had any pain in spinal column. She replied, "No." I asked permission to examine the spinal region, and found a slight but demonstrable curvature of the spine, most marked between the shoulder-blades. While pressing along the side of the spine in this region, the patient winced and said: "Doctor, for several years I have had an almost constant pain under my right shoulder-blade." She is now being treated for spinal curvature. In this case intra-ocular examination revealed nothing abnormal in the fundus, With proper correcting lenses the vision was normal.

CASE II.

Miss S., aged twenty-seven, consulted me about two years ago complaining of the same ocular symptoms which so annoyed Miss L. The picture presented by the iris and anterior chamber was in every respect identical with that given in the former case. Again I asked permission to examine the spine, and found a high degree of lateral curvature, most marked in the interscapular region, together with the same pain "under the shoulder-blade." In this case, as the patient stood erect the lower end of the right scapula was one inch from the centre of the vertebra, while that of the left was more than three inches distant. The appearances of the shoulder and hip usual in such cases were well marked. Up to the time of Miss S.'s visit to me she was unaware of the spinal condition.

CASE III.

Miss C., aged thirty, of whose ocular sufferings I had heard a good deal before I had an opportunity to examine her eyes, had consulted several able ophthalmologists and had given each a prolonged trial, faithfully endeavoring to carry out the instructions given her. She had received no benefit whatever. As soon as I saw Miss C.'s eyes I asked to examine her spinal column, for the ocular picture in no way differed

from that presented in the above mentioned cases. To my surprise and disappointment, the spine was apparently perfectly straight, nor could I make out any symptoms which would aid me in my belief that the cervico-dorsal spine was the origin of the ocular manifestations. Accordingly, I went over the field already examined by her former oculists. Compound oblique astigmatism was present—correction of the whole of the refractive error or of various parts of it in no way lessened the ever-present painful manifestations of severe ciliary spasm. The only relief Miss C. obtained was through the prolonged use of atropia, paralyzing completely the ciliary muscle. Indeed, Miss C. asked time and again to be allowed to keep her pupils constantly dilated. The instant the effect of the atropia wore off, the pain in the eyes and in the head returned. Drugs gave no relief. I removed a large spur from the septum, in hopes that as it pressed constantly into the turbinate the cause might be found there. This effort was of no avail. Two wisdom-teeth were extracted, for one root of each was found to have been forced backwards in its growth until it pressed against the adjacent molar; the eye symptoms continued as before the extractions. All use of the eyes was forbidden and an outdoor life prescribed. This, too, brought no relief. Forced rest in a sanatorium did no good. Finally, about eighteen months after Miss C. first came to me, I received a letter from her, saying the cause of her trouble had been discovered; that an X-ray picture of her spine had been taken, and that there was found "a thickening of some kind inside the canal"; that she did "not understand exactly what was its nature." This case is easily the most interesting of the three; and the diagnostic value of the ocular picture which I have called "the spinal eye" becomes more apparent. Absence of (by me) demonstrable spinal symptoms caused me to neglect the diagnosis suggested by the eye conditions, with a consequent failure to relieve the patient.

The objective ocular picture and the subjective symptoms are both the result of chronic disturbance of the cervico-dorsal sympathetics. This clinical entity is not uncommon. I have seen it a number of times. All of

these cases complain of inability to use their eyes with comfort in reading, writing, or sewing. In none of the three cases here reported were there any visible changes in the fundus. In all three cases, with glasses correcting the refractive error the vision was normal. In all three cases the external muscular errors were slight. In one case the refractive error was +1 D. in each eye. In two cases there was oblique compound hyperopic astigmatism. In none of these cases, nor in any similar case which I have seen, has wearing glasses correcting the refractive error given the comfort the patient hoped for. In two of the three cases glasses gave no relief at all; the third case is too recent to make use of in this connection. In one or two cases the patient has apparently gotten some relief from the use of glasses. These cases were, however, not under observation long enough to learn the reason of this. In the worst case of this kind I have seen, that of Miss C., the wearing of glasses gave absolutely no relief whatever—indeed, any correction of the refractive error seemed only to aggravate the pain and discomfort. In all cases the pupil responded to the action of mydriatics, and the eyes which were examined more than once gave always the same refractive condition. In the case of Miss C. the ciliary spasm was very marked. In most of the cases the eyes were abnormally sensitive to light; in two cases photophobia was much complained of. Mrs. F., aged sixty, was the oldest case of which I have records. In this case too there was marked curvature of the spine in the cervico-dorsal region. In all cases I have seen, save one, that of Mrs. F., the pupil was contracted. In the case of Mrs. F. the pupil was in size about normal. This was probably explained by the fact that there were in the fundus neuro-retinal changes of nephritic origin. In all cases the shallowness of the anterior chamber was marked; in some cases, however, more so than others. In all cases there was present the peculiar bowing of the

iris, giving the appearance of a bulging lens beneath. In all cases the iris responded normally to light. In every case the symptoms were bilateral and equal in degree on both sides. In all cases the eyes were a source of almost constant discomfort; in some, of such intraocular pain as to be explainable best on the supposition of ciliary spasm.

In all cases save one, that of Miss C., there was present cervico-dorsal spinal curvature. In the case of Miss C., although judging from her letter spinal disease has been demonstrated, I have been unable to find out its exact nature. At first glance, where the objective symptoms described above are most clearly marked, the resulting picture suggests the one at times presented by certain intraocular conditions which are accompanied by marked lowering of the tension. Indeed, in the first of these cases which I noticed, I felt sure—judging from the appearance presented by the iris, anterior chamber, and lens—that I had to deal with eyes the seat of deep structural changes, and it was only after a careful ophthalmoscopic examination that I convinced myself that the picture was one resulting from disturbance of the sympathetic. I then examined the neck of my patient, thinking it possible some thyroid disease might be playing a part in the production of the ocular condition. Finding no trouble in the neck, I next examined the cervico-dorsal region of the spinal column. I found there lateral curvature.

While I think the spinal trouble produces the symptoms described, I have no sufficient explanation of the exact mechanism of their production. It would seem that we have to deal with either partial paralysis of, or chronic irritation from stretching or pressure upon, the oculo-spinal sympathetic. Probably the latter. The myosis following extirpation of the cervical sympathetic is said to become gradually less marked and may disappear. In the cases under discussion the myosis persists. I have noticed no observation to the effect that, following resec-

tion of the cervical sympathetic, there results a bowing of the iris and apparent bulging forward of the lens with a lessening of the depth of the anterior chamber—which three symptoms together with a contracted pupil make the picture in the cases here reported. We must bear in mind, however, that, in cases where sympathectomy has been done for glaucoma, the eyes were already so diseased as to make the production and recognition of this picture practically impossible. Whether this picture is produced in normal eyes after bilateral sympathectomy has been done for the relief of the symptoms of thyroidism, I do not know.

I have had no opportunity of determining in what proportion of cases of lateral curvature of the cervico-dorsal spine the above mentioned ocular symptoms are present. That they are present in some cases is important, for the recognition of the cause of their production serves to explain why treatment applied to the eyes fails to give relief.

POSTSCRIPT.—Since the above article was written, now seven months ago, Miss C. has been so far relieved by the wearing of a steel jacket, that the eyes no longer show the evidences of sympathetic disturbance. With the disappearance of the picture the ocular sufferings have in a large measure disappeared also.

A CASE OF MONOCULAR OPHTHALMOPLEGIA INTERNA AND EXTERNA, WITH PARALYSIS OF THE ABDUCENS AND TROCHLEARIS.

By DR. OTTO LANDMAN, TOLEDO, OHIO.

THE case is of interest because of its complete recovery and because it shows the possibility of a lesion causing pressure in the superior orbital fissure and compressing adjacent structures without involving the optic nerve.

The history is as follows:

Patient, B. W. S., aged twenty-eight. The onset of the trouble was very sudden. On August the 16th, the patient had some headache over the left side of his head, which persisted on the 17th when he developed a temperature of 100° F. The headache grew worse, and on the 20th he saw double a little and the upper lid of the left eye began to droop. I saw the patient in consultation with his family physician, who said that since the beginning of the attack he had tried analgesics of various kinds to control the pain. I found on the 20th that the patient had slight ptosis of the left upper lid, and no other paresis demonstrable. There was a slight proptosis. He closed the left eye voluntarily to exclude the second image, as he said, and on account of great photophobia. The pain was in the forehead of the left side and around the eye, and was present day and night. There was tenderness to pressure over the supraorbital nerve. Pupils of both eyes were very much contracted. The right eye was normal. Because of its sudden onset and preponderance of the supraorbital neuralgia the case was at first regarded as one of ophthalmic

migraine and therefore quinin was administered, but without obtaining any relief from the pain.

Aug. 23d.—I was called to see him again and found an *ophthalmoplegia externa*. Lues was suspected and not denied for he had contracted the primary lesion five years before. Inunctions of mercury and potassium iodide in large doses were now prescribed.

Aug. 26th.—With the exception of a trifle more protrusion of the eye the condition was the same. Still the patient said that the pain was less during the daytime. Fundus normal.

Aug. 28th.—*Mydriasis and paralysis of accommodation.* Exophthalmus. Less pain. Fundus normal.

Aug. 31st.—*Paralysis of the superior oblique and external rectus.* The case to-day was one of *complete ophthalmoplegia interna and externa with paralysis of the abducens and trochlearis.* Exophthalmus. Fundus normal. No pain to-day.

Sept. 4th.—Has not had any pain since the last visit, *i. e.*, for five days. Exophthalmus more pronounced. Fundus normal.

Sept. 10th.—Exophthalmus less, other symptoms same.

Sept. 14th.—There was a slight movement in the external rectus. Fundus normal.

Sept. 25th.—O. D., V=¶. Jr. 1 at 8 inches.

O. S., V=¶. — 1D^s V=¶. Jr. 4 at 12 inches. External rectus gaining in power and he can move the eye downward a little. Fundus normal.

Oct. 2d.—The ptosis is disappearing. Pupil is normal. There is a slight divergent strabismus. Fundus normal.

Oct. 9th.—O. S., V=¶. Jr. 1 at 8 inches. No diplopia. The movement of the eye normal. There was a very slight proptosis. Fundus normal. From now on the case was uneventful. Treatment consisted, after August 23d, of inunctions twice daily of a drachm of *unguentum hydrargyri*, for three weeks. Potassium iodide was given in increasing doses which rapidly rose to 750 GRAINS A DAY and was continued till October 23d.

To review the case briefly we find that the protrusion of the eye came on quickly.

There was *pain day and night*, but it was severest at night. The exophthalmus was too great to be explained by the relaxed paralyzed muscles and there may have been a gummosous tumor in the region of the superior orbital fissure; there was something more than a periostitis. Goldzieher¹ says concerning the exophthalmus: "The rule is, however, that the question is not one of an orbital abscess, but of a hyperplastic process which extends from the periorbita to the orbital fasciæ."

The *diplopia* lasted for a little more than seven weeks.

The *fundus* was *normal* during the whole course of the malady.

The *vision* was *normal* except at one examination, when there was a spasm of the ciliary muscle producing a myopic refraction.

There was an *intense neuralgia*, which is contrary to the rule, for anaesthesia of the region supplied by the first division of the trigeminus is given as one of the symptoms in lesions in and around the superior orbital fissure.² The gradual implication of the muscles is of interest:

First a *ptosis*; three days later, an *ophthalmoplegia externa*; five days after this, an *ophthalmoplegia interna*, followed after an interval of three more days by a *paralysis of the superior oblique and external rectus* and marked *exophthalmus*. The eye was as immovable as if it had been stone. It was remarkable how quickly the pain all subsided when the antisyphilitic treatment was begun. The cause was probably a *gummatous process* in or around the *superior orbital fissure*, producing pressure.

The pressure is explained by the anatomic and physical condition of this region. According to Merkel and Kallius, a very dense connective-tissue membrane, several millimetres in thickness, closes the superior orbital

¹ Goldzieher, "Ueber Syphilis der Orbita," Par. No. 10. *Sammlung zwangloser Abhandlungen aus den Gebiete der Augenheilkunde*, 1902.

² Wilbrand and Saenger, *Neuroglia des Auges*, pp. 215 and 218, vol. ii.

fissure, perforated for the passage of vessels, the oculomotor, abducens, and trochlearis nerves, and the first division of the trigeminus.

"Should this membrane become inflamed, then a consecutive, localized periostitis can induce dire results by strangulation of the nerves."¹

The following cases will be quoted to emphasize the question of *prognosis* when one eye is involved.

(a) Fejer's case. A woman fifty-three years of age; complete paralysis of third, fourth, and sixth nerves and involvement of the first division of fifth. *Anæsthesia* of cornea, exophthalmus; complete recovery upon administration of potassium iodide.²

(b) Thompson reports: A complete paralysis of all the eye muscles of one eye, with *anæsthesia* of the ball and skin over frontal muscle, with slight exophthalmus. Optic nerve hyperæmic. Cure by antisyphilitic treatment.

(c) Areus saw monocular total ophthalmoplegia with ptosis and frontal pain; almost total amblyopia of the eye. Cured by antisyphilitic treatment.

(d) De Luca reported a case, monocular total ophthalmoplegia, great pain in the parts supplied by the first division of the trigeminus. Cured by antisyphilitic treatment except that a slight ptosis remained.

(e) Cooper reports a similar case cured, but the abducens remained paralyzed.

(f) Rochon Duvigneaud reports three other cases, in two of which the foramen opticum was implicated.³

Thus from the brief review of these cases the *prognosis* is very favorable when syphilis has been the cause.

¹Wilbrand and Saenger, *Neurol. des Auges*, paragraph No. 119, p. 317, vol. i.

²In "Ergebnisse der allgemeinen Pathologie (1901) und pathologischen Anatomie des Auges." *Bericht über die Jahre 1879, 1898, 1899*, p. 282. Orbita.

³Cases b, c, d, e, f, Wilbrand and Saenger, vol. i., pp. 317 and 318.

In two of the cases the optic nerve was involved, and in De Luca's case slight ptosis remained, and in Cooper's case the abducens remained paralyzed.

The case reported in this paper made a complete and perfect recovery within a period of two months.

There have been a few cases of monocular complete ophthalmoplegia reported, where trauma and other conditions have complicated the cases,¹ but this paper does not deal with such cases.

¹ Through Dr. W. G. Spiller's courtesy I add the following references:

LLOYD. "Complete Unilateral Ophthalmoplegia." *Annals of Ophthalmology*, Jan., 1898.

BOUCHARD. "Un cas d'ophthalmoplegie unilatérale, totale et complète, avec cécité du même côté." *Journal de Neurol.*, Nov. 5, 1906, p. 549.

HOWARD I. HANSELL and WM. G. SPILLER. "Two Cases of Unilateral Total Ophthalmoplegia; Crossed Hemiplegia being Associated with the Ocular Paralysis in One Case." *Annals of Ophthalmology*, 1899, vol. viii., p. 328.

RESEARCHES ON THE PHYSIOLOGY AND PATHOLOGY OF THE LENS.

BY DR. GUST. FREITAG OF WÜRZBURG.

Translated from Vol. LIV., German Edition, March, 1906, by

Dr. JOHN I. MIDDLETON.

(*With three figures in the text.*)

I. THE INFLUENCE OF CHANGES IN THE LENS UPON THE REFRACTION OF THE EYE.

I WAS led to make the following communication through the kindness of Professor Hess, to whom I now wish to express my sincere thanks. I wish to discuss here briefly and comprehensively the subject-matter of the title, and to try to gain new points of view for further research.

It is a matter of experience that the human eye in general becomes more hyperopic with age; to which changes in the lens chiefly contribute.

The question then arises, How can we explain a higher refraction caused by the lens in old age? Indeed, this is found not infrequently, and is even by many regarded as the rule in intumescent cataract; Förster mentioning it for the first time in 1873.¹

There has lately been a renewal of the observations of a peculiar anomaly of the lens described as "false lenticonus," "lens with double focus," "pseudo-cataract," often classed with beginning cataract formation; whose essential quality is a greater or less difference in the

refraction of the several parts of the lens, so that periaxial high myopia is found, in contrast to a more hyperopic zone near the æquator.²

Similar are the relations between anterior and posterior lenticonus. Regarding these changes in the refraction of the lens, it seems right to cast a stronger light upon the optical conditions referred to. Conditions causing, wholly or partly, the refraction of the lens arise through alterations in curvature and index of refraction. Since the lens is not homogeneous, but consists of concentric layers whose refraction increases towards the interior, and which can be clinically distinguished, as age advances, as cortex and nucleus, the curvature of the nuclear surface and the nuclear index of refraction must be considered separately. For the influence of the lens upon the total refraction of the eye must be considered also with reference to its position towards the percipient surface.

Fig. 1.

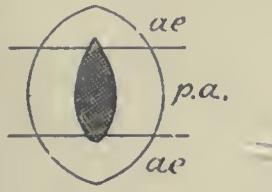


Fig. 2.



Donders³ based the hyperopia of old age upon an increase in the index of refraction in the cortical parts of the lens. Whether this physiological decrease in the total refraction is generally of really so great an amount as is usually thought, is a question for further enquiry. If, according to Young,⁴ Senff,⁵ Zehender,⁶ and others, the cortex be thought of as two concave lenses that surround the more or less spherical nucleus (Fig. 2), then must the effect that weakens the refraction of the nuclear part increase, the greater its index of refraction becomes.

Through the proof by Hess⁷ of the regular presence of reflex images from the lens-nucleus in persons over twenty-five years of age, which usually are wanting under this age, we can definitely prove an increase in index of refraction between substance and cortex, as age advances. It does not then do for us, as Hess emphasizes, to explain senile hyperopia by increased index of refraction of the cortex, as this was pretty generally done; because, even accepting this, we must suppose an increased index of refraction on the part of the substance; which (other things being equal) would raise, rather than lower, the refraction of the whole eye. A diminution of the latter could be also conceived through decrease of the cortical index, while, according to the statement just made, an even greater diminution of the cortical index would have to follow. Such a physiological increase in the amount of water in an aged lens is contradicted by all experiments; so that, in the face of well-known facts and measurements, we need no further explain such a possibility.

Under these circumstances there remains, for the explanation of the lessened refraction of the senile lens, nothing but an increased destructive action of the cortex to be considered; and for this we must seek as causal indication not a growth of its coefficient of refraction but, among the more immediate possibilities, an increase in the lens-radii; and this without regard to an increase

in nuclear curvature, whose influence is yet to be explained. This consideration is of value with the view most generally advanced, that the surface of the lens is more curved than its cortex. If, as seems justified by the occasional appearance of flat nuclei, we suppose a greater radius for the nuclear circumference than for that of the whole lens—at least in some cases—then the cortical parts lying fore and aft upon the nucleus act no

Fig. 3.



longer as condensing lenses; being able no longer to weaken the refraction of light through the nucleus, but only to strengthen it. (Fig. 3.)

In this case, then, we can expect a rise in the general refraction as a result of the increase in the cortical index of refraction; while a diminution is only possible through a decrease in the condensing power of the cortex; which can ensue through a decrease in its refracting index or the curvature of its anterior or posterior surface. The occurrence of a decrease in the cortical index in old age is, indeed, not to be entirely excluded; still, on this point there are many contradictory views. By supposing the nucleus to be flat, as well as somewhat curved, we see in the reports to date an explanation of the physiological hyperopia of old age as lying most probably in the lens-radii; only in a very flat nucleus could lie the explanation of a physiological lowering of the cortical index. Increase in the refraction of the periaxial parts is to be expected, without considering the relations between the curvature of nucleus and that of cortex, always through increase of the nuclear index.

With the rise in refraction caused by the cortex we must, on the contrary, again consider the form of the nucleus. If the latter be more curved than the surface of the lens, the cortical layers act as concave lenses, and their weakening influence upon the nuclear refraction can be hurt, through decrease of either lental radii or cortical index. Now a lessening of the lens-radii occurs in both forms of lenticonus, whose refractive conditions are readily explained by it; whereas in the "lens with double focus" the very lack of recognizable change in curvature of the surface has led to the separation of its clinical picture from that of true lenticoni. A decrease in the cortical index in this questionable anomaly has been differently construed by Demicheri,⁸ however.

In the myopia observed in intumescent cataract a

causal participation of the cortex, from before, inwards, is probable. This is indicated by the apparently inconsiderable change in the nucleus in questionable cataract, but above all by the shallow anterior chamber, so often seen. For this we must suppose an increase in thickness in the lens, in the first place; and this would result in a decrease in the refraction (other things being equal), which can be compensated for by an advance of the vertex of the lens.⁹ An increase in curvature of the anterior surface of the lens in myopia from cataract seems, then, doubtful: the regular increase in volume of the cortex surrounding the nucleus would first lead to an increase in the lens-radius. We must therefore take for the explanation of questionable cataract from myopia a lessening of the index of the cortex. Outside of the periaxial zones, the conditions are simpler in the equatorial zone of the lens; for its refraction must be lowered by decreased index of the cortex as well as by increased radii of the lental surface.

The fact that in the foregoing remarks the physiological conditions of growth of the lens were not considered and will be but briefly touched on is based on the difficulty of measuring their influence by our knowledge to date. That the thickness of the lens increases with age is a fact, proved by measurements, ^{10, 11, 12}. The amounts given vary, between 2.46 mm for the age of 9-12 months and 6.5 mm in old age. Hess¹³ found for the age of seventy-nine amounts of 4-5 mm. The very increase in thickness must occasion a loss of refraction, were not, through simultaneous advance of the anterior lens-surface and, with it, the optical nodal point of the whole system (with a resultant increase in refraction), a partial or complete compensation set up; but how much in a single case, every research has so far failed to show.

If we said above that senile hyperopia is to be explained by the decrease in the lens-curvature, the statement is

not affected by considering the physiological conditions of growth; because a general increase in the lens must result in an increase in its radius of curvature; and Priestley Smith has referred to this. The æquatorial zone, too, has its refraction lowered by enlargement of its radii. Stadtfeld has given the spherical aberration of the lens, for parallel rays (outside of the eye), as about 3 dioptres at a distance of 4.1 mm from the axis.¹⁴ How far this normally higher refraction of the æquatorial zone can be influenced by the increase in lens-radii with age, and how things really are in the living eye, is not yet well known. We can, however, almost suppose that the refraction decreases relatively to the equator, since the curve of the surface even in old age seems less than in the pupillary zone; the reflex image from the anterior surface of the lens grows in size towards the pupil's edge, even in very old people as well. Of this I have often been convinced.

The occurrence of myopia in intumescent cataract cannot be attributed to the physiological changes in the lens; but to the decrease in the index of the cortex is the most probable significance to be attached; counting the influence exerted by an advance of a swelling lens. In a "lens with double focus" we most probably have to do with abnormally great differences between the indices of nucleus and cortex. Already we have seen that this periaxial myopia without change of form can only be explained by increase of index of the nucleus or decrease of index of the cortex, or both. Through these two factors the occurrence of periaxial myopia can be understood; the influence, however, upon the refraction of the æquatorial parts must be different with each.

The very fact of an abnormally high nuclear index can have no influence upon the refraction of the æquatorial zone, whereas a lowering of the cortical index must be followed by a lowered refraction of the former. This last

would seem specially adapted to call forth differences between nucleus and cortex. The refractive conditions of "lens with double focus" so far noted are so discordant that it seems necessary to subject each case to more exact analysis. But this only pays when the clinical and experimental findings are carefully applied. So this condition had best be presented specially. But let us lay stress on one point. All eyes that in advanced age are attacked by the questionable affection have this in common: they formerly had good sight for distance, and thus were nearly emmetropic. A lowered index of the cortex, then, would have had to cause hyperopia in the lens-zone, the amount of which would be considerable as concerned the great influence of the diminution of the index upon the periaxial zone.¹⁵ It is now shown that, in a case of double involvement, pictured by Halben,¹⁵ and among thirty-eight eyes examined so far by others, very high æquatorial hyperopia was present (13 dioptres); while periaxial emmetropia was proved. If so excessive a hyperopia as Halben's in an otherwise normal eye is to be thought a rarity, both eyes, after extraction, had good distant vision with plus 9 and plus 10 respectively—a proof that no axial hyperopia of any extent could be present. The high æquatorial hyperopia previously found must, then, arise mostly from the condition of the lens; whereby, anomaly of form not being accepted, a decrease in cortical index becomes possible. The author of the case describes a cataract formation of fine spokes spread over the whole lens. I leave it undecided how far by this means the decrease in the index seems more easy of explanation than if it occurred in an entirely clear lens.

The other thirty-eight eyes in the literature showed periaxial myopia in each case. There were, of these, thirteen (36%) æquatorially hyperopic—that is, on an average, 2.5-4 dioptres. But only eleven gave signs that the refraction as compared with that of the other eye

had undergone pathological change, since in two cases the same hyperopia existed also in the second sound eye. How far these eleven, though, are valid for such an acceptation, can only be proved by success in better basing the entire picture of disease on new observations. Most of the cases (twenty-two, or 64%) of "lenses with double focus" we must for the time being regard as true myopia of the lens-nucleus; because in each, æquatorial emmetropia, or else slight myopia, was present. If the influence of the nuclear curvature on the refraction in the cortical layers has been repeatedly thought of, no account has yet been taken of the exact relations of cortical and nuclear refraction.

If there is a difference in index between both, an increase in curvature of its boundary will cause both a higher refraction of the nucleus and a greater divergent effect of the cortex. Since now smaller curvature changes are necessary to alter the refraction of a lens, the greater its index is, so will an increase in curvature in the cortical-nuclear zone (through which the convexity of the nuclear surface decreases just as much as the concavity of the inner cortical surface decreases) strengthen the condensing power of the nucleus much more than the diverging power of the cortex.

Till now we have not succeeded in estimating the radii of curvature of the lens-nucleus; but the way to do it has been, perhaps, shown by Hess, through the discovery of physiological reflex images from the nucleus. This will be referred to in another place, where I shall also refer to the point at which, in the lens-axis, whether nearer the anterior or posterior pole, the layers of greatest refraction lie; since clinical observations of dislocations of the lens-nucleus occur (*i. e.*, behind in posterior lenticonus).

Without doubt, after all, the refraction of the lens, and, indeed, the refraction of an eye, is a most complex conception. Study of its separate terms will offer us

the key to understanding many a, till now, equivocal phenomenon. A step towards further understanding might be taken by thorough application of the cases of "lens with double focus," which offered so seldom, yet which do not apparently occur so seldom; by systematic consideration of the relations of the reflex images; by studying the refraction of the æquatorial parts of the lens in their relation to the periaxial in a large number of persons of different ages, we gain a footing for observing in what amount such differences in refraction exist and how far they are to be considered as physiological; besides any relations of this lens-condition to cataract formation. While this is undertaken by many, others, like Szily¹⁶ and Hess,¹⁷ decline further effort, based on the fact that lenses with double focus seem to become cataractous either late or never. Finally, we try to base by experiment the influence of nucleus and cortex upon the refractive relations in the lens as well. These points of view are to be the basis of later researches.

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² For practically parallel incident rays two lental zones can be distinguished which can be separately treated: periaxial, within which all rays of light reach the nucleus, and æquatorial, which, on the contrary, usually hidden, wholly or in part, by the iris, consists of cortical substance (Fig. 1.). Yet "æquatorial" may serve as an abbreviation for "lying towards the equator," since the true æquatorial region of the lens, even when the pupil is dilated, cannot be taken into consideration as regards vision.

³ DONDERS. *The Anomalies of Refraction and Accommodation of the Eye*, p. 174, 1866, Vienna.

⁴ YOUNG. On the Mechanism of the Eye, in *Philosophical Transactions*, 1801, vol. xcii; and in *Miscellaneous Works of the late Thomas Young*, pp. 28 and 29, vol. i, Peacock, 1855, London (Donders, l. c., p. 34).

⁵ VOLKMANN's article, "Sight" in Part I, vol. iii, Wagner's *Handwörterbuch f. Physiologie* (Donders, l. c.).

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II. THE NUCLEAR REFLEX-IMAGES IN THE HUMAN EYE.

In his work on "lens-images that arise through reflection upon the nucleus of the normal lens,"¹ Hess could prove the regular occurrence of such in normal eyes of persons beyond the age of twenty, while till then the existence of such even in very old people had been regarded as entirely pathological (Guttman, Demicheri, von Szily, and others). Hess, on the contrary, did not find these images so constantly in young persons, although he saw them in one case of nineteen years of age; but he had not taken up a systematic search in youthful eyes, to any extent.

These physiological variations in the period of the first appearance of the nuclear images made it desirable to fix upon a greater number of people of the age referred to within which range individual differences are present. In the following pages I give the results of my own observations of this in eighty-one persons between five

and seventy-seven years of age. The people of greater age in whom nuclear images were to be expected surely were specially brought in, to gain a standpoint for comparison of the intensity of light in the nuclear images at various ages. The source of light used was the same as was portrayed in the publication mentioned. The binocular magnifying-glass was used, to enlarge the images. The utmost was done to attain regularity of the conditions under which the reflex images were to be observed, so necessary for comparison of results. All cases of opacity of the lens or deposits upon the anterior capsule were excluded; further, all corneal opacities, as far as they were sharply defined and not so small as to cause trouble only through a certain easily avoidable stoppage of light. Greater amounts of refraction are especially mentioned. Since the intensity of the lens-images depends upon the quantity of light meeting the lens, the breadth of the pupil had to be considered in each case. However, with a narrow pupil a negative result does not mean that with a wider one the nuclear images are not to be seen.

To estimate the case, with a negative finding, a minimal width of 6 *mm* of pupil was taken as a measure. All patients with a narrow pupil were homatropized, or, where this could not be done, excluded. An absolute uniformity of conditions was not to be reached in reference to the individual differences in effect of homatropin. Moreover, the intensity of the light of the osmium lamp could not be kept absolutely constant. The same was true of the distance of the lamp from the eye examined, though the lamp was supplied with two bits of metal for leaning it upon the forehead and upper jaw of the person examined. So, in general, the distance of the glowing thread from the cornea could be taken as about 5 *cm*. Thus the observations refer to this minimal distance. In each case the lens was illuminated temporally, nasally, above, below, and from the front.

The behavior of the extremely good cortical images (Purkinje-Sanson reflex-images) was naturally the well-known one: far behind the intensely light corneal image an anterior lental image of little light intensity and not sharply defined, and in front of it the little sharply defined image of the posterior lens-surface. The relative positions of the nuclear images were to be known by Hess's work: posterior nuclear reflex behind the cortical reflex, anterior nuclear reflex before the anterior cortex, movements of the nuclear reflexes in the same direction but less abundant than the homonymous cortical reflexes. One hundred and forty-seven normal eyes, in eighty-one persons, were examined. From the table we see that up to the age of thirteen inclusive, in no case was there a suggestion of nuclear reflexes. Among five persons of fourteen years of age there was in two a delicate gray film, between cornea and anterior lens-reflex, distinguishable. The first to show real nuclear reflexes was a girl of fifteen, but in the whole decade from fourteen to twenty-four years, a changing condition of the images considered was seen. In twenty-six cases at this period they were completely lacking in sixteen, while in the rest they were more or less clearly to be seen. The anterior and posterior nuclear reflexes were not always equally clear; as a rule, the anterior was visible more plainly than the posterior one. In four persons of twenty-four years the nuclear reflex—generally the anterior—was sharply defined. In every one over twenty-four, a very distinct nuclear reflex could be got. And after thirty-one, in none of those examined was the posterior one wanting. In one case I got it in one eye only—fifty-seven years old. And in a few cases before the thirty-first year it could not be found with certainty. Accordingly, from the basis of my observations, the middle of the twentieth year can be given as the period at which practically, as a rule, nuclear reflexes appear. But at least a whole decade before

this must be regarded as the period of physiological variation.

The statement made by Hess, that in man the difference in refraction between cortex and nucleus increases with age, is hereby confirmed; just so by the fact again proved by my cases that the nuclear reflexes become ever of greater light intensity with age. At the ages of sixty and seventy the anterior nuclear reflexes are distinguished, above all in reference to their light intensity, little or not at all from the cortical reflexes. That the posterior lens-reflex is generally seen somewhat later than the anterior one, is entirely beyond doubt; at least, by my own findings. Whether the suppositions here occurring—that the steeper index-curve appearing on the cortical circumference in old age develops later in the posterior lens-layers than in the anterior ones, or whether the light absorption of the aging lens-nucleus plays here a considerable rôle—must yet remain undecided; nevertheless, on this subject we can reach a conclusion, perhaps, by careful refractive examination.

The question raised by Salzmann² in a description of Hess's work, whether the nuclear reflexes "change their position in old age" (he means, their position with reference to the cortical reflexes), cannot be decided certainly with our present method of research. Even if we, through harmonious methods, confirmed changes in the reciprocal distances of cortex—or nucleus—reflexes, it would be hardly possible to draw correct conclusions as to the increase in nucleus in relation to that of the cortex at different ages. The anterior surface of the lens possesses, at different distances from the middle of the pupil, a different curve, of whose changes with age we know nothing.

Hence, the position of the appropriate reflex depends on many circumstances, difficult to overlook, and also in single cases not calculated; as would have to be, to answer

that question. The same is true of the other lens-reflexes. And this leaves out of account the difficulty of measuring accurately the depth of the reflexes, in any way at all.

In a case of seventy I once observed that the posterior lens-reflex lay before the posterior cortical one, though the distance of the source of light was the usual one. According to the above, such a departure from the rule is less wonderful. In the behavior of both eyes of one and the same individual in a single case, the one already mentioned, little difference could be found. The posterior nuclear reflex, in one eye not visible, was, in the other eye, of the least light intensity, yet clearly visible. In all other persons the two eyes differed in no wise as to the lens-reflexes.

In closing, I beg to thank Professor Hess for kindly reference and manifold support of my work. To the assistants in the clinic my many thanks are due, for their friendly aid.

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TABLE SHOWING THE NUCLEAR REFLEXES PRESENT AT VARIOUS AGES

PATIENT.			NUCLEAR REFLEXES.						REMARKS.	
Age.	Pupil mm.	1 or 2 Eyes.	Anterior.			Posterior.				
			clear.	uncertain.	failed.	clear.	uncertain.	failed.		
5	6	2			+				+	
5	6	2			+				+	
5	7	2			+				+	
8	6	2			+				+	
8	7	1			+				+	
9	6	2			+				+	
9	6	2			+				+	
9	7	2			+				+	
9	7	2			+				+	
9	6	1			+				+	
10	6	2			+				+	
10	6	2			+				+	
10	6	2			+				+	
10	7	2			+				+	
11	6	2			+				+	
12	6	2			+				+	
12	6	2			+				+	
12	7	2			+				+	
12	8	2			+				+	
12	8	2			+				+	
13	6	2			+				+	
13	7	2			+				+	
13	6	2			+				+	
14	7	2		+					+	
14	7	2		+					+	
14	6	2			+				+	
14	7-6	2			+				+	
14	6	2			+				+	
15	7	1			+				+	
15	6	2			+				+	
15	6	1	+	+					+	
16	9	1			+				+	
16	6	2			+				+	
17	7	1			+				+	
17	7	2			+				+	
17	7	2			+				+	
18	8	2			+				+	
18	6	1			+				+	
18	6	2			+				+	
18	8.5	2			+				+	

High myopia.
Hyperopia of 5 dioptries.

PATIENT.			NUCLEAR REFLEXES.						REMARKS.	
Age.	Pupil mm.	1 or 2 Eyes.	Anterior.			Posterior.				
			clear.	uncertain.	failed.	clear.	uncertain.	failed.		
18	6	2			+			+		
18	7	1	+					+		
19	6	2	+		+			+		
19	5	2			+			+		
20	7	2			+			+		
20	6	2			+			+		
21	9	1			+			+		
23	6	2			+			+		
23	6	2	+		+			+		
24	6	2			+			+		
24	4	2	+							
24	5	1	+							
24	5	2			+					
24	6	1	+							
26	8	2	+							
27	6	2	+							
27	5	2								
27	6	2	+							
30	7	1	+							
30	4	2	+							
31	8	2	+							
34	5	2	+							
37	4	2	+							
42	8	2	+							
43	5	2	+							
49	7.5	2	+							
51	6	2	+							
54	7-6	2	+							
56	6.5	2	+							
57	7	2	+							
58	6.5	2	+							
61	5	2	+							
61	7	1	+							
62	6.5	1	+							
63	7	2	+							
64	7	2	+							
68	7	2	+							
70	6	2	+							
73	8	2	+							
73	7	1	+							
77	6	2	+							

Posterior nuclear reflex visible only in one eye.

Posterior nuclear reflex certainly a little before the posterior cortical reflex.

PARALYSIS OF THE FOURTH CRANIAL NERVE
DUE TO TRAUMA, AND THE MEANS USED TO
OVERCOME THE RESULTING PARALYSIS OF
THE SUPERIOR OBLIQUE MUSCLE.

BY DR. WALTER HAMILTON SNYDER, TOLEDO, O.

THE comparative rarity of this condition is the excuse for reporting this case, and the means used to overcome the condition are believed to be not generally used, as inquiry and search find few cases of this palsy reported at all and but few ophthalmologists are using the amblyoscope in the exercising of paralyzed muscles. A few points of special interest in this case are: (a) The very distressing vertigo caused by the diplopia, and this is probably more annoying with this nerve paralyzed than any other of the ocular supply; (b) the non-effect of medicinal treatment at the time the exercises were started; and (c) the peculiar way the muscle gained strength, *i. e.*, the index for fusion on the Worth amblyoscope might be 25° for one week, and although the patient exercised daily for two or three ten-minute periods he would not be able to advance one degree, then perhaps the next day he could fuse as easily at 20° as he had the day before at 26° . The curve of improvement is very irregular and abrupt, and the time to overcome the last five degrees was almost the time needed for the reduction from 30° to 5° .

In an experience that covers many paralyses both traumatic and from disease, I have found that the greatest relative improvement is often and usually made in the

first few weeks—that is, the degrees of improvement; while in fact the deviation in this case increased 2° after iodides had been taken for two weeks and only began to decrease after the steady use of exercises for two weeks.

The Black modification of the Worth amblyoscope was used as it permits of a vertical adjustment most necessary in these images which are not on the same level. This instrument is ideal in that it allows each object to be seen no matter what the deviation, and is far superior to prisms when the deviation is great, and is much superior also for the practical accomplishment of muscle exercises for the relief of paralysis. All authorities agree that monocular paralysis of the superior oblique muscle without any other nerve or muscle being involved is exceedingly rare. The fourth cranial is more rarely affected by basal lesions than the third or the sixth, and still more uncommon are the cases in which it is the only nerve implicated, since the third nerve is almost always in the symptom complex and the sixth nerve and optic-nerve tracts and crossed hemiplegia usually form a part. Leber¹ reports two cases of falls on the head in which paralysis of the fourth nerve was the main symptom. As in my case there was no fracture, but Leber held the paralysis to be due to rupture of the trunk of the nerve owing to the concussion of the skull. Dunn² reports a case of fourth-nerve paralysis from blow on the head which I shall speak of later. The three above with my own are the only cases I can find in which this nerve was the only one injured from trauma. Neiden³ reports a case in which paralysis of one fourth nerve was the only focal symptom of a tumor of the pineal gland the size of a walnut. And M. Quintela⁴ reports two cases

¹ *Archiv für Ophthalmologie*, xxvii., 1, S. 297.

² *Ophthalmic Record*, October, 1903.

³ *Neurologisches Centralblatt*, 1879, Nr. 8.

⁴ *Revista Med. del Uruguay*, April to July, 1902.

where paralysis occurred after trepanning of the frontal sinus.

My own case is as follows:

J. M., aged twenty-six, hoisting engineer, on September 26, 1905, was struck over the left temporal region by a piece of falling brick at a building at which he was working. He then fell through a skeleton floor about sixteen feet, striking on top of his head, slightly on right side. He was taken to the hospital and the scalp wound sewed up, and he was unconscious for some hours and bled from both ears and nose. On October 9th, I was asked to see him for a paralysis of one of the eye muscles. The Saturday before he became very dizzy and he had been that way until to-day. He had double vision in looking forward and down. It increased on looking toward the right side. I found paralysis of the superior oblique muscle and it was necessary to use a 26° prism to fuse the images. He complained of roaring in the ear and a great deal of vertigo. He stated also that on the Sunday before there had been a discharge of watery fluid from the nose, but I was unable to determine whether it was enough to indicate a fracture of the cranial bone. The ear canal showed the presence of blood clots and there had been a rupture of the membrana tympani. The noise in the ear was complained of most bitterly. Hearing was normal both by air and by bone for forks and whistle. Vision O. D. $\frac{1}{2}0$ (paralyzed muscle), O. S. $\frac{1}{2}2$. Fundus normal in each eye. The amount of prism necessary to fuse gradually increased to 28° and on the Worth amblyoscope the index was at 35° when images were fused. He had been placed on potass. iodid, 45 grains per day, from the day after injury, without improvement. In fact the deviation increased 2° or to 30° in all. When I saw him, October 9th, the muscle had not recovered any of its strength and I suggested that he begin the daily use of the amblyoscope. This was done daily for two weeks, when he was suddenly able to fuse the images at 25° , a few days later he fused them at 22° , then for about two weeks there was no improvement, then he began to fuse at 20° . About three weeks elapsed without any improvement although used daily,

and he suddenly fused at 14°. After that he overcame the paralysis slowly, as the dates and records show:

December	14, 1905	15°
December	23, "	13°
December	30, "	7°
January	6, 1906	10° (Head has been aching a few days.)
January	18, "	10°
February	12, "	5°
March	5, "	2°
April	8, "	0°

His ear record is as follows: His ear was treated by gentle inflation and some existing catarrh of the tube was treated also, and for many days he would feel very well. Slight roaring in both ears continued and dizziness lessened. There seemed to be two causes for dizziness, one when the ears were bad and roaring and second from the vertigo caused by double vision. Inflation would control the noise and ringing for some hours. November 6th, a careful test was made of the hearing and the right ear at that time showed bone conduction best and slight loss of hearing for voice, while left ear showed air conduction best, but so far as ordinary conversation was concerned he did not notice any loss of hearing. The ears steadily improved with the exception of a small furuncle in the canal, until November 11th, when the roaring lessened. He then complained of deafness in the left ear. This was only determined by most careful fork and whistle test and varied in intensity from day to day with the barometric pressure.

When I saw him last, May 25th, he was about the same and he still had noises in rainy weather or in changeable weather; he also had an attack of frontal sinus inflammation which was opened and drained. So far as his eye was concerned he made a complete recovery in six months. His ear probably suffered very little from the injury as he already had a certain amount of chronic catarrh of the middle ear and no tests had ever been made previous to the accident of his sight or hearing.

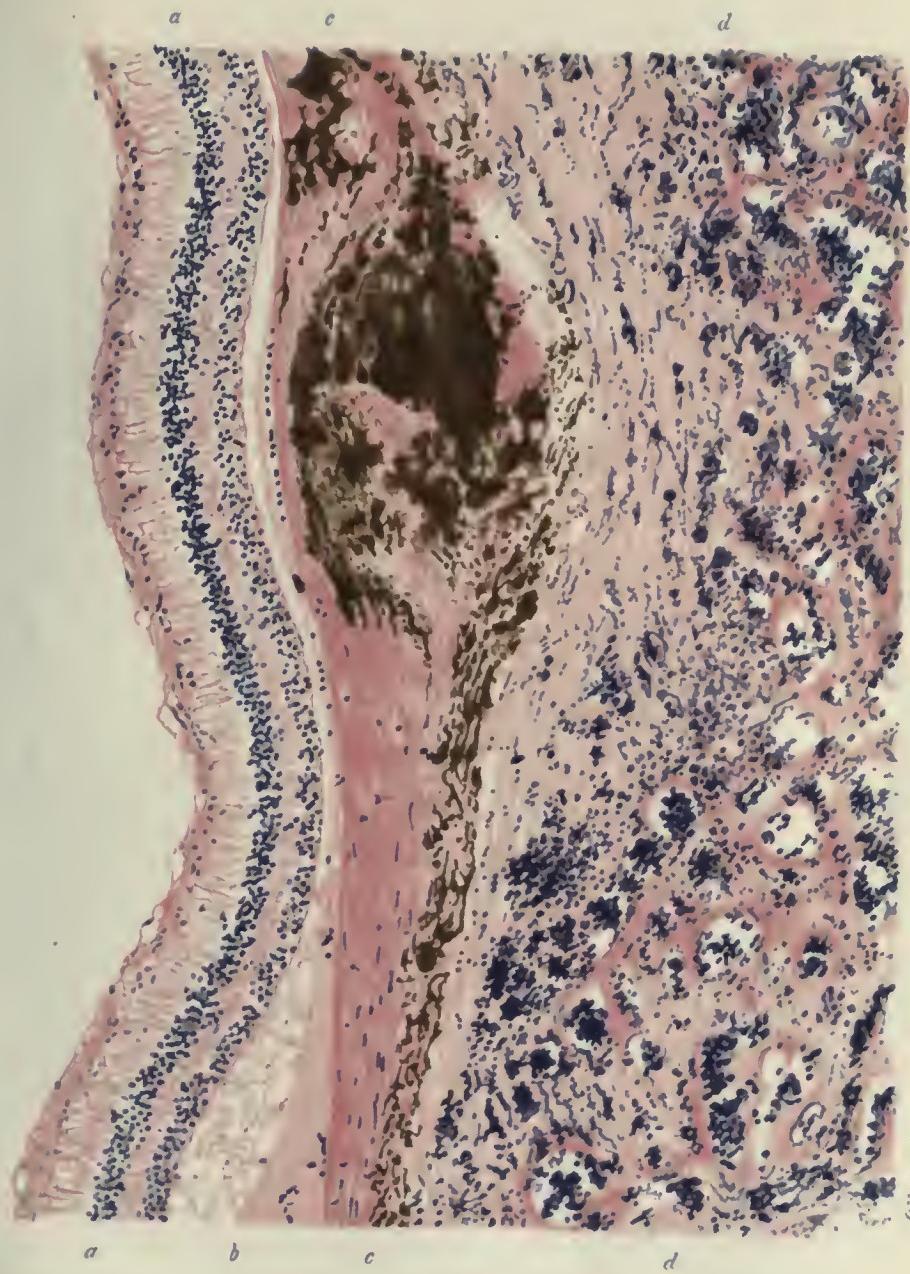
Dr. Dunn's case previously spoken of has the following exactly similar points with my own: No improvement until end of fourth week. Then a gradual improvement; and the last few degrees went so quickly that "he suddenly realized that his double vision was gone." I have no doubt that this nerve always recovers from paralysis in practically the same manner, viz., by weeks of no improvement and then suddenly gaining a large amount, to be followed by apparently no gain for some time. In my case the prognosis was of importance from the legal side as to the permanent injury done this man and how an equitable settlement should be arrived at. It was in looking up the chances of recovery that I noted only three cases reported, and that *Systems of Legal-Medicine and Accidents and Injuries* made practically no allusion to the trouble except that it was practically unknown. Dana (*Diseases of the Nervous System*, sixth edition) says: "This is a rare affection and not always easily detected; causes same as those of palsy of the third nerve." Bailey (*Diseases of the Nervous System Resulting from Accident and Injury*, 1906) says: "Injury to the fourth nerve has been rarely recorded. It sometimes occurs with other cranial nerve palsies, etc." To repeat what other text-books say would be a repetition of the above, and the trouble I had in giving a correct prognosis both to the patient and the Liability Company has led me to offer this paper as a solution to this problem when it confronts some other ophthalmologist in the future. With the history of these cases I believe that we may confidently expect a complete recovery of function in from four to seven months.



Rechtes Auge

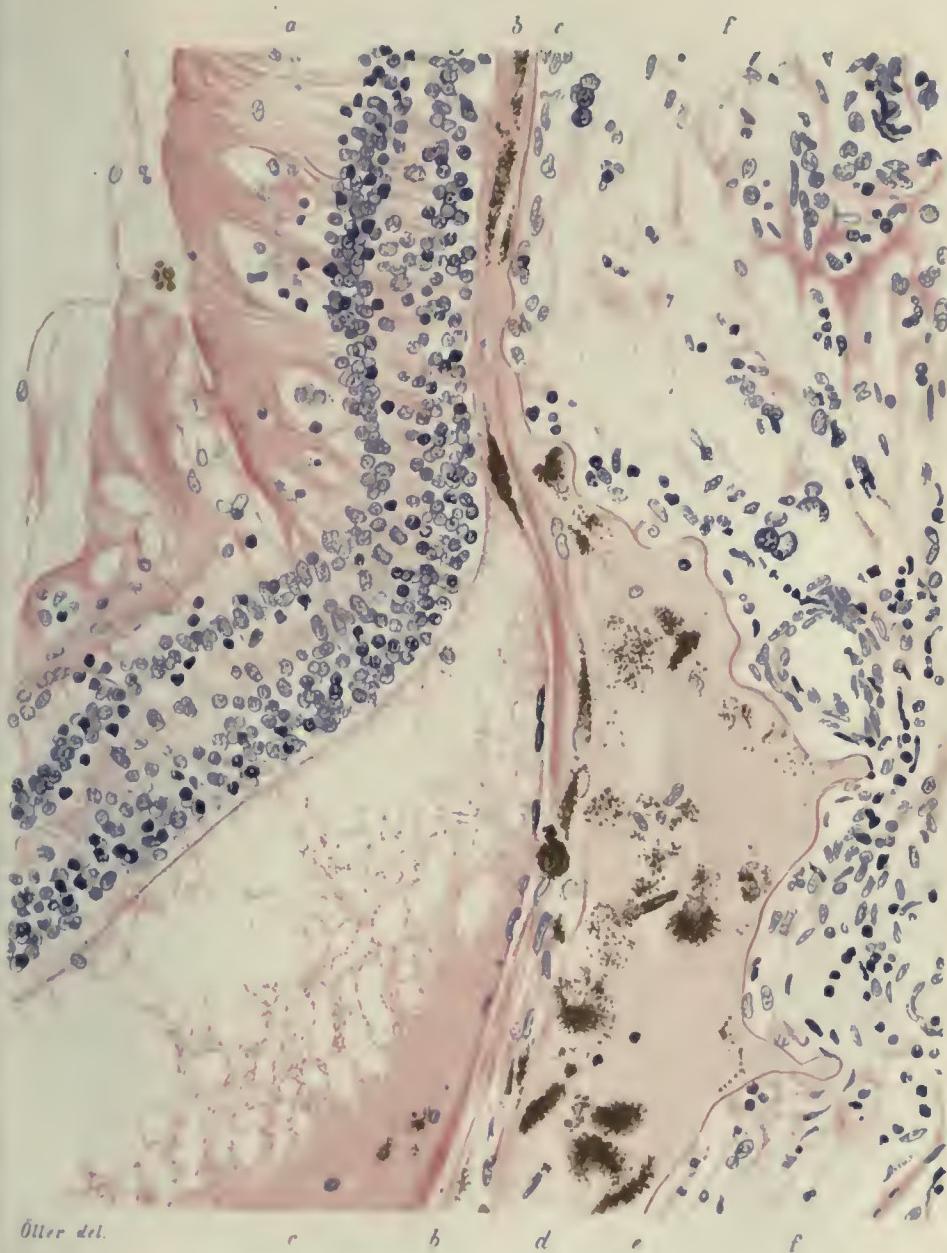


Linkes Auge



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Öller del.

METASTATIC CARCINOMA OF THE CHOROID OF EACH EYE. BILATERAL DETACHMENT OF THE RETINA. REATTACHMENT OF THE RIGHT.

BY PROF. J. OELLER, ERLANGEN.

Translated from the German Edition, Vol. LII., June, 1905, by
Dr. MATTHIAS LANCKTON FOSTER.

(*With appended Plates II. and III. and two figures on Plate A.*)

IN 1903, Krukenberg tabulated the reported cases of carcinoma of the choroid, 37 in all. To these are now to be added one case reported by Oatman, one by Coppez, and two by Brewitt. In ten of these 41 cases both eyes were affected. It would be superfluous to increase this comparatively large number by the addition of another case unless it was distinguished by some special condition, and therefore I propose to deal less with the anatomy of the metastatic carcinoma than with the question of the healing of a retinal detachment.

A woman forty-seven years of age entered my private hospital Nov. 13, 1899, on account of total blindness of both eyes. The right eye had been blind for eight days, the left for two. She stated that she had always been near-sighted. Her right breast had been amputated four years before on account of a tumor. She was very anæmic and cachectic. Examination revealed a total detachment of the retina in each eye, with normal tension. There was no anomaly in the anterior segment of the globes; the mobility was not interfered with and there was no protrusion.

Not the slightest change was detected after fourteen days in bed with pressure bandage and sweating. No improvement was obtained through repeated subconjunctival injections of salt solution, or punctures of the sclera. Deutschmann's incisions were then made three times in the right eye and twice in the left at intervals of eight days. During her stay in the hospital the patient was attacked several times in the morning by severe headache, dizziness, and vomiting. Contrary to all expectation, the vision of her right eye returned during the last days of her stay so that she could see movements of the hand. On Jan. 17, 1900, she was discharged at her own desire. In the early part of March she called again. The vision of her right eye had improved so much that she was able to go alone about the streets, could see the hands of a watch, and could read ordinary print, but she was troubled by a marked night blindness. Unfortunately an accurate determination of the functional capacity and a description of the fundus were not obtained at that time. I wished to paint the peculiar ophthalmoscopic picture for my atlas of rare ophthalmoscopic conditions and made an appointment with the patient for the next day. But she did not appear. Her general condition had become worse and compelled her to remain in bed. I next heard of her death in the general hospital, July 3, 1900. From her sister I learned that after her admission to the hospital on June 4th she again completely lost the vision of her right eye.

The autopsy revealed cancerous formations in the apex of the left lung, in the lower lobe of the right lung, in the pleuræ of both lungs, and in the spleen. There was an extensive gray neoplastic growth on the dura mater on each side and in the left half of the longitudinal sinus. Between the occipital lobes and involving a large portion of each was a large tumor sharply demarcated from its surroundings.

I obtained both eyes, hardened them in Mueller's fluid, and prepared them in the usual way.

MACROSCOPIC APPEARANCES.

Right eye: Opened horizontally. The sagittal diameter was uncertain because of the sunken condition of the cornea;

the equatorial diameter was 21mm . The entire uveal tract except the iris was enormously enlarged. The choroid and ciliary body formed a fairly uniform thick shell, the diameter of which varied between 1 and 2mm . The inner surface of the choroid appeared wavy. The ciliary body was thickened like a club with its inner margin rounded and arched. No ciliary processes could be seen. The thickening of the ciliary body extended to the roots of the iris, which seemed to be pressed slightly into the anterior chamber. No anomalies could be seen in the iris. The cut surface of the tumor was uniformly bright yellowish-gray, with here and there a dark point where a vessel had been cut across. The papilla was greatly swollen but the entrance of the vessels could be seen. The retina was in apposition with the choroid except in a few places where it formed little folds. The vitreous chamber was filled by a uniform gray mass. On the nasal side was a tumor on the surface of and involving the sclera from the equator to the dural sheath, 5mm thick at its thickest part. On the temporal side of the section was an epibulbar tumor 1mm thick which extended from the equator to the optic nerve. The consistency and color of these tumors were the same as those of the choroidal tumor. No connection between the intra- and extraocular tumors could be detected on the nasal side, but on the temporal side there was a looseness of the scleral lamellæ about the posterior ciliary vessels and nerves which rendered a connection between them probable. There was nothing abnormal about the cornea or the lens.

Left eye: Equatorial diameter $21\frac{1}{2}\text{mm}$; sagittal uncertain because of the sunken condition of the otherwise normal cornea. There was the same shell-like condition of the entire choroid as in the right eye, but in some places its thickness was greater— $2\frac{1}{2}\text{mm}$. It became gradually smaller as it approached the ciliary body, which protruded into the eye in the form of a triangular point. The root of the iris also formed an angle toward the corneo-scleral margin. The iris appeared to be normal. The retina was totally detached, connected with the entrance of the optic nerve by a slender pedicle and lying anteriorly against the posterior surface of the otherwise normal lens. The small space in the retinal

funnel, as well as the subretinal space, was filled by a uniform black clot, which had become separated in the hardening fluid from the subjacent choroid. No epibulbar extensions of the tumor could be found.

MICROSCOPIC APPEARANCES.

Right eye: The normal structure of the choroid was completely gone except in the choriocapillaris and in parts of the layer of transitional vessels. The pigmented stroma cells had disappeared, leaving no traces in many places, in others isolated patches of pigment and traces of the processes of pigment cells. The stroma consisted of bands of connective tissue of different degrees of development, with long, oval, or spindle-shaped nuclei, which formed spaces of varying form and size in the beautifully red bands. Often long spaces that ran parallel to each other alternated with round or oval alveoli which were frequently very large and intercommunicating. This system of spaces was filled by an enormous number of typical cells, mostly epithelial, with large nuclei and very little protoplasm packed closely together, with others richer in protoplasm, but often with such indistinct margins as to give the impression of giant cells. Most of the nuclei were oval and very large, some measuring 12 or 15mm. The smaller the nuclei were, the better they were stained; only scattered particles of chromatin could be seen in the margins of the very large ones. Relatively few cells of the size and appearance of the ordinary round cell were mingled with the large epithelial cells. As these cell conglomerates were cut in the section longitudinally or otherwise there appeared to be in the alveoli of the stroma long tubes or round or oval nests of cells. In the middle and outer layers there were foci of softening of various ages and forms. Usually several alveoli were filled by a homogeneous mass stained red by eosin, or by granular detritus, evidently due to mucous or gelatinous degeneration of the tumor cells, because among the typical tumor cells in an alveolus cells could be frequently met with which were undergoing mucous transformation. In other places the softened contents had been completely absorbed, the spaces in the stroma had collapsed, and the

bands of connective tissue had fallen together. On the slides these places attracted attention by their bright color. Some of them contained masses of small pigment granules of hematogenous origin, the results of hemorrhages.

In the posterior and middle parts of the choroidal tumor there were very few vessels, while the choriocapillaris was well preserved (Plates II. and III.). The layer of transitional vessels could be differentiated as such, at least in places. Typical tumor cells were present within some of the transitional vessels and capillaries, also in one of the posterior lamellæ of the sclera and along a little vein which had been laid open by the section. The lamina vitrea was well preserved and adhered closely to the surface of the tumor (Plate III., e). This alveolar construction with the alveoli filled with characteristic tumor cells continued into the ciliary body but terminated abruptly at the root of the iris. In the ciliary body there were mingled with the large epithelial cells more small ones with round or oval nuclei which looked like ordinary round cells. The ciliary processes, iris, and filtration angle were intact.

The optic nerve behind the lamina presented the characteristic signs of a slight interstitial inflammation. The nerve fibres and the glia tissue exhibited no change. The papilla was greatly swollen by œdema from venous obstruction. Between the nerve bundles were numerous spaces which were filled neither by round cells nor coagulated fibrin. In its outermost layers and between it and the commencement of the granular layer were isolated, sharply defined, long or round nests of typical cancer cells which could not be demonstrated to be connected with the choroid. The retina lay on the choroid, folded in only a few places. The internal limiting membrane was detached from the layer of nerve fibres and lay in shallow folds (Plate III.). The interspace was in great part filled by a crumbly mass in which were suspended occasional migratory cells, hyaline flakes, and a very few round cells containing pigment. A small amount of pigment could be found in the layer of nerve fibres and the external granular layer close to the optic nerve and in the layer of nerve fibres toward the ora serrata. The pigment.

occupied by preference the adventitial sheath of the vessels and was extracellular, in the form of brownish lumps of various sizes, or enclosed in round cells (haemogenous pigment). Mueller's basal fibres were somewhat thickened in only a few places (Plate III.). The individual layers of the retina were surprisingly well preserved. The outer granular layer was somewhat rarefied in places and in some places their nuclei mingled with those of the inner granular layer. The external limiting membrane had been penetrated in a very few places by the nuclei of the outer granular layer. The rods and cones were entirely gone, on many slides not even a cadaveric trace could be found (Plates II. and III.). The pigmented retinal epithelia also were either completely gone or were degenerated.

Most extensive changes had taken place in the space between the vitreous lamella of the choroid and the outer limiting layer of the retina. Large areas were occupied by a homogeneous layer, coagulated by the hardening fluid and stained red by eosin, which had originated from the great subretinal effusion that had formerly existed. (Plate II., b, and Plate III., c). In places it was absent so that the external limiting membrane lay either upon the lamina vitrea, or on a layer of newly formed connective tissue on the surface of the latter, but in most places it was as thick as the intergranular layer of the retina. Where the retina was folded it was even thicker as it filled in great part the space of the fold. Next to the limiting membrane it lost its homogeneous appearance and presented an edging of very delicate irregular network, apparently artificial. This layer contained various elements. In its innermost part were round nuclei, evidently from the outer granular layer, mostly scattered but sometimes in small groups; in the middle and outer parts retinal epithelium and the products of its transformation predominated. The retinal epithelium did not form a coherent membrane on the vitreous lamella until it reached the ora serrata. On many slides not a normal epithelial cell could be found, and they were wanting over areas of greater or less extent, or the position of the former layer was indicated by single cells, or by rows of cells lying near or over each other, with round or

oval, black or intensively stained large nuclei, often with enclosed molecules of pigment. On the vitreous lamella were scattered over large areas long, large pigment spindles in single or multiple rows. The nuclei of these cells were often so covered by pigment as not to be visible; others were round or oval, dull or intensively stained. Extracellular molecules and lumps of pigment were also present. In places there were long cords of pigment cells and amorphous pigment (Plate II.). Similar elements to those on the vitreous lamella were present in the transudate with the addition of large round masses of pigment and pigment cells.

Another peculiarity here was the presence of delicate fibres and firm bands of connective tissue. The fibres were for the most part very long and tense, running meridionally and enclosing oval or spindle-shaped nuclei which were necrotic or intensively stained. The nuclei were often enormously long, slender, and difficult to distinguish. Frequently pigment granules were close about the nucleus. These fibres extended though the transudate either singly, or several close together separated by interspaces. Dense bands of fibres were also scattered irregularly in the space between the optic nerve and the ora serrata which took a red stain and often attained a length sufficient to extend over several microscopic fields. Their breadth was variable. Some had scarcely the diameter of a granular layer, while others were as broad, at least in places, as the thickness of the retina (Plate II., c). In such places the layer of transudate was for the most part absent, as if it had been consumed in the formation of the fibrous bands. The latter ran meridionally, or took a slightly wavy course, and often joined with connective-tissue fibres to form lamellæ which contained a very few elastic fibres. They had numerous oval or spindle-shaped nuclei which varied as to their staining capacity. A particularly large layer of this newly formed fibrous tissue united the retina to the vitreous lamella for a considerable distance from the optic nerve. Where there was a fold in the retina and where there was a deep indentation in the surface of the tumor, the connective-tissue bands were stretched through the midst of the space thus formed (Plate III., b). As a rule,

the connective tissue developed gradually and extended uniformly for long distances, but a large band would suddenly cease with its rounded end extending into the transudate. Large bands also formed nodes (Plate II.) which pushed the retina forward. In such nodes the fibres were degenerated, some swollen so as to give the impression of hyaline substance, some crumbled into round or oval flakes, or angular fragments. Such places also contained balls of amorphous pigment and large pigment cells.

In its periphery the retina presented the appearance of senile oedema and the cylindric cells of the pars ciliaris retinæ were largely detached by a homogeneous effusion stained red by eosin, in which round cells and physaliphores were embedded. The anterior segment of the sclera, the lens, and cornea appeared to be normal.

The stroma and nests of cells were the same in the epibulbar tumor as in the choroidal, but it contained no foci of softening. It was apparently caused by propagation of tumor cells from the choroid, at least such cells were present in large numbers along the nerve sheaths and the sheaths of the ciliary vessels.

Left eye: The choroid was infiltrated with tumor cells from the optic nerve to the root of the iris, and the tumor presented about the same characteristics as the one in the right eye. There were more pigmented stroma cells to be found, some intact, others atrophied, and there were fewer and smaller foci of softening. The layer of transitional vessels and the choriocapillaris were almost completely involved in the tumor. The lamina vitrea was intact. The layer of retinal epithelium began as a continuous membrane at the ora serrata. Over large areas there was no trace of the retinal epithelium, or the only traces were large round or oval, faintly stained nuclei, or pigment granules strewn over the vitreous lamella. In places there were single large pigmented cells with nuclei jutting into the subretinal space. In other places intensively pigmented round cells lay in heaps. There were few colloid bodies on the vitreous lamella.

The retina was totally detached from the optic nerve to the ora serrata. The rods and cones were absent over large areas; where they were present large spaces existed between

the rows. In the parts adjoining the layer of rods and cones was a perfectly homogeneous mass of coagulated transudate which contained large roundish pigment epithelium, in isolated cells or in little groups, and also fine pigment granules. There were occasional pigment cells in the layer of rods and cones, and a very few in the outer granular layer.

The penetration of the tumor through the sclera, though not demonstrable macroscopically, was evident microscopically at a place corresponding to the passage of a vorticose vein. The optic nerve was filled with typical nests of epithelial cells in connective tissue. In its centre, where the central vessels could not be demonstrated, the foci were not as close together as in the margin. The pial sheath and the intermediate space between the sheaths were involved in the new growth, the dural sheath alone could easily be distinguished as such. In a longitudinal section the tumor cells could be seen to penetrate along the sheath of a posterior ciliary vessel into the optic nerve, and on one side there was a small tumor in the angle between the dura and the sclera.

These characteristics leave no doubt that this was a case of carcinoma. As it could not have occurred primarily in the choroid it must have been metastatic. It originated from the carcinoma of the breast, although four years intervened between the extirpation of the latter and the appearance of the metastasis.

The literature in regard to metastatic carcinoma of the choroid is so abundant that a consideration of this tumor might be omitted as not atypical, but there was one point in which that of the right eye was exceptional. It may be assumed as self-evident that a tumor of the choroid may cause detachment of the retina, but it is very peculiar that a retina which has been detached by means of a tumor should become reattached as the result of the growth of that tumor. I think that the microscopical examination furnishes a valuable contribution to our knowledge in regard to the reattachment of a detached retina. Although my results agree on the whole

with Uhthoff's, in many respects they are supplementary, and I am obliged to assume a different standpoint to explain certain anatomical conditions, without impugning the correctness of Uhthoff's explanation of his own case. His case was one of chorio-retinitis albuminurica. He considered the subretinal effusion to be an exudate and the bands of connective tissue which later developed between the retina and choroid to be an inflammatory product. This theory was supported by the presence of circumscribed inflammatory foci in the choroid where adhesions with the retina had taken place. In my case there were no inflammatory foci in the choroid and the vitreous lamella remained intact.

It may be well to consider the method of detachment before presenting my theory.

The cancer cells were doubtless carried into the eye by the blood and produced cancerous emboli in the choroidal vessels. The cancer cells proliferated in the vessels until they broke through the walls and rapidly spread in the loose stroma of the choroid. As they usually enter the choroid through the posterior ciliary arteries metastatic carcinomata generally occur about the optic nerve. It has never been explained why metastasis does not occur in the region supplied by the central artery, or in the choroidal veins. Brewitt pointed out that no case had been observed in which the retina had been affected simultaneously. My case forms an exception, but the extension of the carcinoma was not through the central artery. The isolated nests of cancer cells in the retina close to the optic nerve were plainly due to the transportation of cancer cells in the adventitial sheaths of the ciliary vessels.

Metastatic carcinoma probably starts in Sattler's layer, the same as sarcoma, at least the outer layers of the suprachoroidea and the choriocapillaris are not involved at first. As the tumor develops it may involve the entire

thickness of the choroid and leave the choriocapillaris almost intact, as proved by my case. It is apparently the flat extension of the new growth which enables the vision to remain comparatively good until it is suddenly lost through the onset of a detachment of the retina. The detachment is produced not by the crowding of the tumor, but by the nutritive disturbances in the affected choroid, which are partly toxic, from the metabolic products of the tumor, and partly caused by circulatory disturbances. When such disturbances can be compensated for by collateral circulation, the effects of these changes will be limited. When a great part of the choroidal vessels are involved in the tumor, or closed by emboli as in metastatic carcinoma, the pressure in the remaining vessels must be increased and a transudate or oedema will take place into the tissue of the choroid, which under the constantly increasing pressure must filtrate through the vitreous lamella between the retinal epithelium and the layer of rods and cones. In spite of the union between these layers there must exist a lymphatic interspace, because Schwalbe found that injections of Berlin blue very often penetrated between the pigment layer and the layer of rods and cones of the retina. The albuminous transudate is dammed to a certain extent in this lymph space. The relatively slow process exerts its injurious influence slowly, but before detachment takes place microscopically demonstrable nutritive changes have been effected in the retinal epithelium and the rods and cones. Wagenmann and Krueckmann have demonstrated how energetically and characteristically the retinal epithelium and the rods and cones react to nutritive disturbances. Ligation of the ciliary arteries induces degeneration in the regions supplied, so that microscopical detachments are produced by the destroyed epithelium and rods and cones. Pathologically changed retinal epithelium will at any rate furnish less opposition to the current of fluid

toward the retina, and with the increase of the transudate to a certain point detachment occurs, at first in the form of blebs, but finally separating the entire retina from the subjacent tissue. This process is rendered possible only by the creation of space for the detachment by means of the removal or absorption of the fluid of the vitreous, and an increase of tension, even though very transient, and not very high, must be assumed in order to press the vitreous fluid through the zonula into the posterior chamber. This, the secretion theory, seems to me the most plausible explanation of a retinal detachment caused by a tumor of the choroid. Even the author of the retraction theory, Leber, grants its correctness in this form.

This brief statement of the genesis of detachment is necessary in order to understand the equally important question of the reattachment of the retina. It is self-evident that the subretinal effusion must subside in order to permit the replacement of a detached retina. This may occur spontaneously and the influence of treatment is not as hopeless as formerly. In this case I believe that the operative procedures, particularly Deutschmann's incisions, should be accredited with a great part of the cure. If a diagnosis of metastatic carcinoma of the choroid had been made at first I would not have operated, but aside from the history of an amputation of the breast four years before, there was no indication of the presence of a tumor, and if the result had proved that an operation should not have been undertaken I think the error would have been excusable.

A large part of the sub- and *præretinal* fluid was permanently drawn off by the repeated scleral punctures, possibly also little hemorrhages may have glued the choroid and retina together at the points of perforation, but yet a great part must have been absorbed. The behavior of the choriocapillaris seems to me to be of

decisive importance in the absorption of the subretinal fluid, especially in cases of spontaneous recovery, in the same way as absorption of fluids from serous cavities is performed by the limiting membranes. There can be no doubt that simple absorption of the subretinal fluid may suffice to bring about reattachment through simple adhesion; clinical experience furnishes examples of spontaneous recovery with intact function and ophthalmoscopically normal fundus. During the subsidence of a subretinal effusion detached portions may be seen to become reattached, leaving no ophthalmoscopically visible traces. But this method of reattachment presupposes that the detachment has not existed too long and that no irreparable changes have taken place in the epithelium and the elements of perception, and this is rarely the case. The degeneration in the rods and cones or epithelium, which in ordinary cases probably precedes the appearance of the detachment, usually advances so that simple reposition of the two membranes is possible only in the places where these elements have been preserved. Where this requisite is no longer present the union between choroid and retina must assume another form.

Schmeller considers the changes which take place in the retinal epithelium a process which precedes detachment, and according to Krueckmann's investigations they may be considered an almost necessary postulate. The degeneration of the epithelium becomes more rapid and extensive with the onset of the detachment, because the epithelium is then inundated to a greater extent by the albuminous transudate. Even in cases in which the retinal epithelium appears intact at the first glance, swollen and roundish cells may be seen to be desquamating either singly or in groups, and the defects thus caused to be undergoing repair from the margins by proliferation of the epithelium. But this epithelium does not retain its normal arrangement, and while the young cells are either

deficient or wanting in pigment so much pigment may be heaped up as to suggest a pathological proliferation of pigment. This briefly sketched process had evidently to a great extent preceded the stage presented in the microscopic preparations of my case. While in other cases of retinal detachment the newly formed retinal epithelia are round, cuboidal, or angular, in this case most of the cells had a marked tendency to assume the spindle form. Some were so pigmented that the nuclei could not be seen, while the nuclei of others were brightly stained, or sometimes necrotic, with few pigment granules or none at all. These spindle-shaped cells, the origin of which from the retinal epithelium could be traced in every possible form of transition, developed into long fibres which lay singly, or united into bands or lamellæ without loss of their fibrous structure or of their nuclei, except at those places where the fibres had become disintegrated. These fibrous bands contained quite large heaps of amorphous pigment and pigment cells. A peculiarity of these spindle cells and of the fibrillæ formed from them was that they bridged over the retinal folds and the depressions on the inner surface of the tumor so as to facilitate the apposition of the retina by diminution of its surface. These fibres doubtless play an important part in bringing about adhesion between the retina and choroid as soon as absorption has taken place. With the exception of Axenfeld's case, in which simple adhesion took place between the two membranes, these bands have been found in all cases of spontaneous reattachment of the retina which have been examined microscopically.

Uhthoff considers it to be a product of adhesive choroiditis, a connective-tissue new formation of mesodermal origin. My opinion is different. In my case there were no foci of inflammation or inflammatory products in the subretinal space, while the vitreous lamella was perfectly intact. There were no blood-vessels even in

the densest bands of fibres, a condition which Krueckmann also holds to differentiate between an epithelial and a mesodermal formation. The even extent of the process over the inner surface of the choroid seems to me evidence against the origin of these fibres from inflammatory exudates, which usually are circumscribed in locality. The only theory which remains is that the formation of the connective-tissue bands is a product of the cells there present, which are epithelial and of ectodermal origin. There is nothing remarkable in this theory when we consider the analogous genesis of capsular cataract, the appearance of which greatly resembles these bands of fibres.

The theory that connective tissue can be formed from retinal epithelium is supported by other observations. Schmeller says that where retinal detachment is present with atrophy of the choroid, as in posterior staphyloma, atrophic pigment cells deficient in pigment and spindle cells are found. Hess found that the inner wall of an orbital cyst consisted of a thick layer of cellular tissue resembling connective, which contained elongated cells that proceeded directly from the pigment epithelium. The delineation of the changes in Elschnig's case seems particularly instructive as it was one of metastatic carcinoma of the choroid.

Indirect support is given the theory by the fact that the retina which had become reattached was not pigmented, although from the ophthalmoscopic picture a considerable migration of pigment would have been expected. This observation accords with those of Muegliche and Uhthoff. Pigment was present in the retina in Muegliche's case, but it was expressly stated that it was not as abundant as was to have been expected. In Uhthoff's case as in mine the retina was not pigmented, aside from a very few pigment cells in a few preparations. The principal reason was doubtless the intact condition of the external limiting

membrane. As single nuclei penetrated the outer granular layer through this membrane, it might have been expected that single pigment cells would be met with in the outer layers of the retina, as such cells lay with amorphous pigment in the subretinal space. But these cells were evidently unsuited for migration, and like many others were transformed into spindle cells and connective-tissue fibres. The degeneration of the epithelial layer was the cause of the destruction of the rods and cones of which no traces could be found. Doubtless the rods and cones must in time be destroyed as the result of the detachment of the membrane from the choriocapillaris through which it obtains nutrition, because the nourishment obtained from central vessels of the retina is not sufficient to support them for any length of time. But as useful vision may be obtained after reattachment of the retina, the elements of perception and the retinal epithelium, which form a physiological unit, must be present in sufficient numbers and with intact function. The total destruction of the rods and cones in my case, in which there was for a time comparatively good vision, can have taken place only after the reattachment of the retina as a consequence of the constantly advancing degeneration and transformation of the pigment epithelium, which should transmit nourishment from the choriocapillaris to the elements of perception. Even if the recurrence of total blindness may have been associated with the extremely rare coincidence of a metastatic cancer in the occipital lobe, yet the principal cause was the total loss of neuro- and pigment-epithelium.

This case demonstrates the great danger which still threatens the vision after reattachment of a detached retina. To be sure the metastatic cancer was a steadily advancing injurious influence, while other processes may exhaust themselves at a certain stage.

The bands of connective tissue formed from the de-

generated epithelium are often so large that they are visible with the ophthalmoscope. I agree with Uhthoff that they form the anatomical basis of the so-called striæ which have been considered by many to be pathognostic of a replaced detachment. In the description of a case of striæ in my *Atlas of Rare Ophthalmoscopic Conditions* I differentiated between retinal and subretinal striæ. This differentiation was confirmed by the microscopical examination of this case. The subretinal striæ, which I formerly thought were products of adhesive choroiditis, lie beneath the retina and the fibrous bands which run parallel to them. As retinal striæ, abrupt folds in the retina which cannot be smoothed out alone should be indicated. It may be contended that the name striæ should not be given to such folds, but it has hitherto been thus used, because the anatomical difference between the ophthalmoscopically similar pictures was not sufficiently understood. My case demonstrates that folds may remain after the replacement of a detached retina. I do not refer to the superficial prominences described by Uhthoff, which existed here and there in my own case, but to very abrupt folds the immediate surroundings of which were firmly adherent to the subjacent tissue or cemented to it by a thin layer of transudate. Such completely isolated folds can never become reattached. They are not produced by the contraction of the subretinal connective tissue pressing together and refolding the retina, which had perhaps already become attached, but they must be due to the fact that a retina which has been stretched by a subretinal effusion offers too great a superficies for the subjacent surface. In my case the diminution of the subjacent surface by the growth of the tumor during the existence of the detachment must be taken into account. Such retinal folds, $\frac{1}{2}$ to $\frac{1}{4}$ mm high, particularly if they still enclose transudate and Mueller's fibres are somewhat hypertrophied, must appear as sharply

defined white or greenish-white striae, under certain circumstances with pigmented margins. Sometimes it is difficult if not impossible to differentiate them from the subretinal striae, but prominent striae may be positively pronounced retinal when a favorably running retinal vessel describes a distinct curve.

EXPLANATION OF THE ILLUSTRATIONS ON PLATES II. AND III.

Plate II.

Seibert oc. 1, obj. III. Enlargement 107. Hæmatoxylin-eosin stain.

- a. Slightly wavy retina with well preserved layers, the rods and cones alone completely absent.
- b. Large subretinal transudate under a superficial retinal fold, homogeneous, forming toward the retina alone a delicate mesh.
- c. A large connective-tissue band with numerous long spindle-shaped nuclei. It forms a tumefaction above, which encloses a large mass of pigment. Above and to the left are to be seen plates of degenerated fibres. Below the band of connective tissue is a line of pigment formed from degenerated epithelium. Normal retinal epithelial cells are completely absent.
- d. The inner layer of the metastatic carcinoma of the choroid with the stroma containing alveoli and cancer nests. Choriocapillaris preserved, the adjoining layers slightly involved. The pigmented stroma cells of the choroid completely gone.

Plate III.

Seibert oc. 1, obj. V. Enlargement 305. Hæmatoxylin-eosin stain.

- a. Retina attached above, superficially detached below. Internal limiting membrane replaced by a pigment cell. Mueller's fibres slightly hypertrophied, the rest of the retina well preserved, except that the rods and

- cones are wanting. External limiting membrane intact.
- b. Between the retinal and choroidal limiting membranes (*e*) lies a very small homogeneous layer which contains spindle-shaped pigment cells; below are spindle cells, some strongly pigmented, others scarcely at all, with long processes which extend through a space which exists between them and the detached retina on the one side and the vitreous lamella of the choroid on the other.
 - c. Subretinal transudate, homogeneous toward the choroid, formed into meshes toward the retina.
 - d. Retinal epithelium in various stages of degeneration in the space between the vitreous lamella (*e*) and the connective-tissue fibres (*b*).
 - f. The innermost layer of the choroid. Choriocapillaris perfectly preserved, pigmented stroma cells completely gone. In the upper part of the picture behind the choriocapillaris is a small group of epithelial cells, and in the middle of the picture above is an oblique section of a vessel. Above and to the right in the alveolar stroma are numerous cancer cells.

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BY DR. PERCY FRIDENBERG, NEW YORK.

THE LAW OF ELECTRIC STIMULATION OF THE OPTIC NERVE.

BY DR. EDUARD RICHTER, PLAUE.

SINCE Helmholtz, it is generally stated that the optic nerve reacts to opening or closure of a constant current by "flashes," which, Kiesselbach adds, are caused by muscular contractions. To test this, I have had a pair of electrodes made which allow the nerve to be placed in a very short circuit. One electrode is a thin olive-tipped wound wire, about 16cm long. This wire is passed into the nose and carried backward until it touches the pharyngeal wall. The tip is then turned upward, touching the roof of the pharynx. The other electrode is staff-shaped, ending in a concave plate which is detachable and interchangeable, so as to fit the surface of eyes of various size. It is placed on the lids after having been covered with moist absorbent cotton. The first experiments were made on my own person, and all in a perfectly dark room. The following uniform reaction was noted: With a current of 2 volts, cathode on the eye, anode in the pharynx: cath. closure, negative; cath. constant, neg.; cath. opening, an almost completely uniform, faint light-field, like electric light, occupying the entire surface of the retina. Reversal of the electrodes produced similar phenomena. Increasing the intensity of the current to 4 volts, with the first position of the electrodes: cath. closure, neg.; cath. constant, neg.; cath. opening, a similar effect of light as with

the weaker current—a weak and rapidly disappearing faint light. Reversal of the current, no change. No optic-nerve reaction. With 6 volts, cath. opening was followed by a homogeneous, bright white light. Reversing the electrodes, there was a star-shaped or disk-shaped bluish-green light-effect, a somewhat less brilliant intermediary field, and a peripheral circle of light. This lasted as long as the anode was constant, with little change of intensity, and on opening the anode, was followed by a deep black field. With 8 volts, the same effect, but in greater intensity, was produced. With this intensity of current a certain stimulation more sensory than optical was felt in the nerve. These results show that the direction of the current alone is the deciding factor. The law may be stated as follows: If a stimulus, proportionate to the physiologic receptivity affects the optic nerve, a sensation of light is produced, in accordance with the centripetal light-perceptive capacity of this structure, which lasts as long as the stimulus continues. A stimulus running counter to the functional direction of the nerve, *i. e.* centrifugally, produces a light-effect only when the current ceases and the conduction in the nerve is reversed—restored, that is, to the normal. Irritation of cutaneous nerves in the vicinity of the eye shows that they merely act as prolongations of the electrodes and do not alter the phenomena.

It is to be noted, in refutation of Kiesselbach, that no muscular contractions about the globe, not even of the levator palpebræ, could be observed. In case the electrode is placed on the bare eye, the current must be decidedly weakened.

FURTHER REMARKS ON FUKALA'S HISTORICAL ARTICLES ON
REFRACTION AND OPHTHALMOLOGY.

BY DR. ED. PERGENS.

In an article on "Optical Lenses in Antiquity," Fukala says that "refracting glasses, correcting lenses, were in use at the time of Theophrastus, 370 B.C." This statement is based on the passage: "For the eyes (the emerald is) good (agreeable), for which reason gems of this stone are worn to see with."

Fukala is of the opinion that the emerald was ground like our loupes, and had refractive properties. Pliny, however, states that it was the color of the emerald which made it agreeable by resting the eyes, much like smoked glasses. Fukala also quotes a passage from Diodorus Siculus: "(The Hyperboreans) claim that from this island the moon can be seen so that it appears but little distant from the earth, and so that individual mounds of earth can be seen on its surface." Fukala concludes that they must have used lenses, and considers the so-called "Druid-heads" to have been refracting glasses. But it is quite certain that we cannot see mounds on the moon by any such means. The "mounds of earth" were undoubtedly cloud-effects, or interpreted by the people as nowadays they think they see mountains, and so on. The statement that Albertus Magnus wrote in 1200 B.C., is evidently a typographical error. In his second article, Fukala concludes, in contradiction of his earlier publication, that Nero was far-sighted and used a convex lens. It does not appear how the concave ground emerald suddenly became convex. Fukala simply says: "Of course, Pliny knew nothing about optics." However this may be, we can hardly suppose he could not distinguish between a convex and a concave stone. In his historical notes on mydriatics, Fukala mentions belladonna and mandragora as identical. Now, mandrake is as old as the hills, and is mentioned in the Ebers papyrus. Pharmacologists do not confound the two drugs. *Atropa belladonna*, Linn., is probably Galen's "*Strychnos maniakos*", while the various species of mandrake are known as *Mandragora officinarum* (Linn.), *M. vernalis* (Bert.), and *M. autumnalis* (Spr.). On page 210 of this article, Fukala has made one person of two different authors, and speaks of "Alkindus, also called Joannes Mesua." The first, Abu Jusuf El-Kindi, was a Mohammedan. The second, Abu Jahja Ben Masweih, was a Nestorian. His name (Messia-) shows that he was a Christian. The confusion was probably due to the fact that Alkindi's "*De Medic. Comp.*" is often printed with the works of Mesua.

TWO SEVERE INJURIES WITH UNUSUAL TERMINATION.

By DR. L. LANDSBERG, DARMSTADT.

I.—PENETRATION OF THE CORNEA BY A PIECE OF BARK.

A young man of nineteen felt a severe stabbing pain in the right eye, just as a railway train passed by. There was some circumcorneal injection, and a penetrating wound 4mm long, in the upper part of the cornea. The anterior chamber was full of blood and the eye soft. The edges of the wound were blackened as if by cinder. The conjunctival sac was disinfected, atropine instilled, and an ice-bag applied over a light bandage. Next morning there was slightly increased tension. The blood was partially absorbed. Behind the corneal wound small black particles like India ink could be seen. Next day the tension was higher, the pupil rather large, lens intact. Large coagula at the bottom of the anterior chamber. The latter was opened with a lance at its lowest point, and tough blood-clot, but no foreign body, evacuated. The father of the patient afterwards stated that the boy had shot at a tree six or seven feet away. As no portions of the revolver or of the cartridge were missing (? P. H. F.) it is to be assumed (?) that a piece of bark was shot off the tree and struck the eye. There is no account of a similar accident in the literature of injuries of the eye.

II.—INCISED WOUND OF THE CILIARY BODY, CURED WITH RETENTION OF PERFECT SIGHT, AFTER REMOVAL OF THE BRUISED TISSUES AND CONJUNCTIVAL SUTURE.

A boy of seven was injured by a piece of glass. He was seen after three hours' trip by rail with a handkerchief bound over the eye. There was an irregular angular wound about 1cm long at the corneal margin. The eye was soft. A portion of iris with bloody black masses and a bead of vitreous protruded. The anterior chamber was full of blood. The eye was unshapely. It was a question whether enucleation should not be performed at once. In chloroform narcosis the prolapsed tissues were loosened, drawn out, and cut off. The soft masses of the ciliary body which protruded greatly were

abscised with a Graefe knife and the wound thus smoothed. Two sutures were passed through the episcleral tissue while the wound edges were held in contact with forceps to avoid loss of vitreous. The conjunctiva was drawn in from all sides and five sutures passed. Atropine was instilled repeatedly and iodoform dusted into the conjunctival sac. Both eyes bandaged. Two days later the wound had closed by first intention. Slight irritation, and ciliary injection. Blood mostly absorbed. Sutures removed on the fourteenth day. A year after the injury vision is $\frac{1}{2}$. There is a small scar in the vitreous with a fine cobweb extending a short distance from it. There is no retraction of the scar. The star-shaped contraction of the conjunctiva is the only trace of the injury. This case again shows the correctness of Kuhnt's advice to be as conservative as possible in the injuries of the ciliary body. The fear of sympathetic ophthalmia is not well founded in fresh cases, in which careful suturing may prevent traumatic irido-cyclitis.

A NOTE ON THE ANATOMY OF THE MYOPIC EYE. (INCIPIENT CONUS; ANNULAR CONUS.)

BY DR. L. HEINE, BRESLAU.

A previous communication on the examination of six myopic eyes is now extended by a study of four more globes. Two of these were the eyes of a middle-aged woman with myopia of 3 D. In life a small crescentic conus was seen with the ophthalmoscope. The third globe, that of a man of fifty-one, had a myopia of 15 to 20 D, had a ring-formed conus and macular choroiditis. The other eye was emmetropic. The fourth globe was taken from a woman with multiple sclerosis. Central scotoma; M. about 7 D. There was an indication of a conus downward in both eyes. The cause of the formation of conus is to be found in the peculiarity of the envelopes of the globe and their different reaction to the increase of size of the globe. Retraction of the lamina elastica and conus formation go hand in hand. This is proven by nine of my ten cases. The fact that in my nine cases of typical conus the

maximum of distortion lay in the level of the lamina elastica, not in that of the sclera, speaks against a direct traction or pressure by the external ocular muscles as postulated by Stilling. The latter may, it is true, have some influence on the axis of traction and so on the form of the conus, but this theory cannot explain the ring-shaped conus. The external rectus alone could be the agent, and, as is well known, a nasal conus is only found long after a temporal conus has been present. Muscular action tending to produce such changes would be mutually antagonistic and neutralizing.

MORBID CHANGES IN THE OPTIC NERVE IN ARTERIOSCLEROSIS
AND LUES.

By DR. REINHARD OTTO, BERLIN.

(A) Four cases of Basal Arteriosclerosis with Compression Symptoms and Circumscribed Atrophy of the Optic Nerve.

(B) A case of Basal Syphilitic Vascular Disease with Pressure Symptoms and Cyst Formation in the Optic Nerve.

The first four cases are a contribution to the study of the severe changes and circumscribed atrophy produced in the optic nerve by sclerosis of the carotid and ophthalmic arteries, the enlargement and hardening of these vessels acting mechanically. The last case shows in addition to these changes from similar causes a further morbid process consisting in the formation of cysts within the nerve at the point of greatest pressure. The sections showed an effect of compression by the carotid alone in the intracranial portion of the nerve, of carotid and ophthalmic combined behind the foramen, and of the ophthalmic artery alone, within the foramen. The most marked lesion is found to be a circumscribed atrophy of that portion of the nerve situated directly behind the foramen. There is a secondary ascending and descending atrophy. It is noticeable that the central portions of the cross-sections are most markedly affected and that small hemorrhages are frequent in the neighborhood of the point of greatest pressure. The former change is seen particularly well at either side of the atrophic zone and consists in a flattening of the central nerve fascicles.

The last case was one of marked luetic changes of the basal vessels, with partial dilatation and partial closure of the bore. The right optic nerve is somewhat flattened behind the foramen, with changes like those noted in the four previous cases, but the atrophy is less pronounced. There are changes in the small vessels of the nerve, and evidences of perineuritis. The left nerve shows complete atrophy at the point of maximum compression, and there is a small zone here where all the tissues have disappeared. In the neighborhood of this cyst small hemorrhagic extravasates are seen, with compression of nerve fascicles and changes in the perineurium. Obliterating processes are found in small vessels extending along the nerve for a short distance. Pressure and vascular changes, particularly obliteration, seem to have combined in the causation of the cyst. Areas of softening were also found in corresponding parts of the brain. The small hemorrhagic extravasates seem to have had little part in this formation, as they are not infrequently found in compression of the nerve.

THE TREATMENT OF TRACHOMA WITH ICTHARGAN.

BY DR. MARCAL FALTA, SZEGED.

The prevalence of this affection in Hungary, and the lack of a specific remedy make it advisable to try any new drug which seems to offer the probability of cure or even of improvement. Operative procedures are to be used with great care and on specially selected cases only in view of the marked tendency to cicatricial contraction which is a well known feature of trachoma.

Icthargan is an organic silver salt in which the silver content is nearer that of the nitrate than it is in any other organic combination of this metal, the percentage being 30, as against 11 for largin. The rationale of the use of these preparations is to produce an intense silver action on the tissues without an eschar or coagulation which would prevent the chemical penetrating to the depths of the affected tissues. In icthargan the silver is bound to ichthyol which, as is well known, has a marked tendency to constrict blood-vessels, besides

penetrating deeply into the tissues with a bactericidal action. The preparation is a loose brown powder with a faint odor like ichthylol. It is only slightly affected by light, easily soluble in water, and should be kept in dark glass bottles as it turns reddish brown under the influence of sunlight. The toxic dose is 0.1-0.15 per kilo of body weight as compared to 0.015 for nitrate of silver.

The use of this preparation in numerous cases of chronic trachoma, many of them with marked pannus, was followed by rapid improvement in a comparatively short time. The chronic form with marked photophobia was the only one which proved stubborn. The more marked the corneal involvement, the greater the benefit from ichthargan, as it cures a well developed pannus in three or four days. The trachoma nodules are somewhat more resistant, and generally require expression to hurry the cure. Ichthargan generally causes some burning pain, which children stand better than adults, and after the use of strong solutions a bluish-white eschar may be seen on the conjunctiva, which is due to the high silver percentage. The solutions used ranged from $\frac{1}{2}$ -3% in strength. Fresh cases of trachoma are cured in from 6-8 weeks.

FATTY DEGENERATION OF THE PIGMENT EPITHELIUM IN A
GLAUCOMATOUS EYE.

BY DR. G. ISCHREYT AND DR. G. REINHARD, LIBAU.

In the case of a man of eighty-five with absolute glaucoma in both eyes, and attacks of pain in the right eye, the following condition was noted. O. D.: Slight diffuse opacity of the cornea with slightly dulled surface. The entire posterior surface was covered with small yellow-brown and orange-colored granules. The aqueous was turbid and contained similar precipitates which had also collected in small lumps and formed a layer running across the upper margin of the pupil. On enucleation and histological examination these corpuscles were found to be endothelial cells in a state of fatty degeneration. The only similar case recorded is that of Leber (1898) in which there was no microscopical examina-

tion. The brownish-yellow and orange granules in the aqueous were interpreted as fatty degeneration with hematogenous pigmentation due to hemorrhages in an inflammatory exudate. The fatty globules rose to the surface of the anterior chamber while the heavier albuminous particles sank to the bottom. In our case there was no evidence of hemorrhage into the anterior chamber. The precipitate consisted of round cells. No reaction of hematogenous pigment could be obtained, and the orange color was undoubtedly due to refraction in the fatty globules. Their accumulation in the aqueous was a part of a peculiar process of degeneration in the pigment epithelium, consisting in a disappearance of the pigment, amounting in some places to complete bleaching, and an emigration of the pigment cells. The pigment granules seem to have been set free by the destruction of their cells. The fatty degeneration is a later stage of the process. As the fatty degeneration was only found in desquamated cells, it seems probable that the aqueous contained fat in solution, and that this was precipitated, as Lubarsch says. An accumulation of fatty cells in the subretinal space probably originated in the pigment epithelium of the choroid. As there was complete occlusion of the pupil it is rather difficult to state the origin of the pigment cells in the aqueous, unless indeed they got there before the iris changes took place. It is possible that they came from the iris itself. There is no doubt that they wandered forward from the depths, probably from the pigment layer of the iris and possibly also from the pars ciliaris retinæ.

FACTORS IN THE RECOGNITION OF TEST-TYPES.

BY DR. ED. PERGENS.

In the determination of the acuteness of vision by means of test-letters, other factors than that of sense perception are included, notably those of intelligence, judgment, and physical processes, such as irradiation, contrast, and so on. Still this form of test is retained, mainly because it is for the purpose of recognizing letters that the patients desire glasses, as well as for its convenience and the ease with which the test

can be followed by the examiner. Numbers and points have the objectionable feature that each object must be pointed out in turn. To determine the various factors which are involved in the recognition of test-types, I have made a series of investigations with large test objects in which the question of a recognition of slight differences was not complicated by fortuitous qualities which would enable judgment or intelligence to play a rôle. Fig. 1 is a regular, dodecahedron, made from a disk which appears at 50 metres in an angle of 5', by cutting away 12 segments. At 16 metres the angular outline was recognized, and at 12 metres the number of sides could be counted. If only one segment be cut away, the flat side is recognized at 31.5 metres, almost twice as far. This is due to comparison with the curved outline remaining. Fig. 3 is a disk of which a sector of 1' converging toward the centre is cut out. In this figure the relative quantity of black and white is at all points equal. The open, or white side (corresponding to the cut-out sector) is noted at 77.5 metres. If a disk of white .3' in diameter is pasted over the centre of the black disk, the open sector is recognized at 124 metres. This is due to an associative action of neighboring surfaces of white. This figure also presents an optical illusion, appearing oval in the direction of the open (white) part of the periphery, while in Fig. 3 the sector does not appear to reach quite to the centre. —Fig. 4 resembles that of Landolt, except that this shows no convergence of the borders of the cut-out. Fig. 5 is of similar construction, except that a square is used and a smaller square cut out of the periphery connecting with another at the middle of the figure. The opening was seen at 127 metres. Tests with small squares placed at various distances from one another showed that the maximum of visibility, *i. e.* of separation, was found when the separating interval was equal to the combined area of the squares. With four equally distant squares forming a square, the maximum is found when the distance equals or is somewhat greater than the amount of black on one side of the constructive square. The apposition of black in a square seems to have an attractive action.

A CONTRIBUTION TO THE PATHOLOGY OF ARCUS SENILIS.

BY DR. M. TAKAYASU, JAPAN.

The investigations of His, Canton, and Virchow have been generally accepted as proving that the corneal changes leading to the clinical picture known as gerontoxon are due to a fatty degeneration of the corneal tissue. Fuchs was the first to oppose this view and to attribute the opacity to a deposit of concrements of a hyaline substance, similar to that which produces pinguecula. The concrements lie just beneath Bowman's membrane, and may project into it, thin it, or even raise it up. Others are seated more deeply in the corneal lamellæ. The concretions do not seem to have any relation to the corneal cells, as they lie free on the surface of the lamellæ. They react to chemicals like hyaline, but more intensely, and are not affected by ether or chloroform so that they are not of a fatty nature as is generally supposed. Leber was able to obtain a calcium reaction by means of oxalic acid in a case of arcus senilis, and considers the concrements a combination of hyaline with lime.

My own studies are based on the examination of 20 eyes of aged subjects with marked clinical arcus, using children's eyes and those of aged persons without any trace of senile change, as a control. The globes were hardened in formalin and imbedded in celloidin. Frozen sections were stained with Sudan III. This dye is easily soluble in alcohol. It colors fat yellowish-red; free fat, as in milk, taking up the color immediately, while that in tissues requires about 15 minutes. Celloidin is the only organic substance which takes this stain, so that it is an excellent means of immediately recognizing fat in tissues or solutions. A saturated alcoholic solution of Sudan will keep perfectly well for six months or more. It has the color of claret. Permanent specimens are counterstained with haematoxylin, fixed in Farrand's solution, and mounted in glycerine. Oil and Canada balsam can not be used as the dehydration with alcohol would dissolve the fat. Specimens prepared in this way showed that the cornea in the region corresponding to the arcus senilis was thickly sown with yellowish-red globules—that is,

fat of various size. The smallest globules can hardly be distinguished with the immersion lens. Others are $3-6\mu$ wide, and twice as long. The smallest granules are generally round. The larger and longer ones lie parallel to the corneal lamellæ. The granules are invariably inside the lamellæ and never in the intralamellar spaces. Here and there they are arranged at the poles of the nucleus of a corneal cell. The superficial layers and those near Descemet's membrane are most thickly sown, the middle layers less so. On the surface, the opacity is bounded by the limit of Bowman's membrane. The latter may end at some distance from the limbus. Each successive layer of opaque lamellæ reaches farther toward the periphery, producing a step-like boundary like that observed by Virchow in parenchymatous keratitis, and may reach far out into the sclera. The narrow translucent ring at the limbus which is considered characteristic for arcus senilis corresponds to the unchanged tissue between the corneal margin and the beginning of Bowman's membrane, but this applies to the surface layers only, as the deeper ones are occupied by fat granules to a point beyond the limbus as we have seen. Toward the centre of the cornea, too, the opacity can be followed microscopically much farther than the clinical appearance would lead us to expect. The pupillary area is always free. Specimens treated with Flemming's solution and stained with osmic acid gave the same results, but Bowman's membrane remained unstained although there can be no doubt that fat globules were present. Hæmatoxylin, eosin, and Van Gieson's stain gave negative results. In alcohol the granules dissolve rapidly and disappear completely. There is, accordingly, no doubt that the basis of arcus senilis is a fatty degeneration of the corneal lamellæ.

TABLES FOR THE DETECTION OF SIMULATED MONOCULAR
BLINDNESS AND AMBLYOPIA.

BY DR. VON HASELBERG, BERLIN.

These tables depend upon the fact that red objects on a white ground are neutralized by red glasses, and appear black

when seen through green glasses. Snellen has made use of this in his charts and later in the optotypes. These are very fragile, not transportable, and are not sufficiently varied. A simulant can also pass these tests by closing one eye.

After correcting any error of refraction in both eyes, the subject is placed in position with his back to the wall on which the test card is to be hung up. The card should never be exposed until the test is begun. A green glass is placed in front of the supposedly weaker eye, and a red glass before the other. The subject is then told to turn round and read the card. The card should not be exposed to direct sunlight, as red reflects too much. In case of actual defect of vision, only the black letters will be read up to a point corresponding to the visual acuteness of the better eye. If the "blind" eye has good vision, the subject will read all the letters, as the red parts seen through the green glass look black also. In case of slight defect of vision, the complete letters will be read up to a certain point, and from there on the black ones only. Rapid closing of the "blind" eye will not help the simulant, as he will only be able to acquaint himself with a single row of letters and will make mistakes when he attempts to read the next. The test is well adapted to demonstration of simulation before a jury. The vision is slightly reduced by the colored glasses. This can be controlled by the examiner. The test can also be combined with the stereoscope, various letters or parts of them in the two different colors being printed on the two cards for the two eyes.

ON RELAPSING VESICLE-FORMATION AND KERATALGIA AFTER
SUPERFICIAL INJURIES OF THE CORNEA.

BY DR. W. STOOD, BARMEN.

Fuchs and Praun are the only authors who mention the clinical picture indicated in the title, which is characteristic and not exceedingly rare. The occurrence and course of this affection, of which I have observed 60 cases, is so uniform and striking that it is not necessary to detail a number of case-histories. The type of the disease may be described as follows:

The etiologic factor is usually an injury by blunt violence of mild degree, causing a slight abrasion with some bruising of the cornea. This generally heals in a few days and the patient is considered cured. After several weeks or months there is a feeling of discomfort in the eye, especially on awakening. The eye feels heavy, is opened with difficulty, and there are marked lachrymation and photophobia. After an hour or so, these symptoms disappear. Examination at this stage shows a small clear vesicle beneath the epithelium at the site of the original injury, or a slight raising of the surface. This point is quite sensitive to pressure or even the slightest touch. At times there is complaint of this sensitivity as well as of photophobia and tearing at a time when even the most careful examination fails to reveal any change in the corneal surface. Examination of the patient on awakening will show a slight opacity or vesicle even in these cases, which will have disappeared in the course of a few hours. In severe cases the eye is much swollen, injected, and painful. There is no increase of tension. The vesicle ruptures, the pain disappears, and the defect rapidly heals, although there may be infection with the formation of an ulcer, infiltration of the base, hypopyon, and chemosis of the conjunctiva. After healing, with or without cauterization, there is rarely a relapse in these severe forms. The most characteristic symptom of the relapsing form is the occurrence of pain and irritation immediately after awakening. The formation of vesicles and the relapses seem to be connected with traction on or bruising of the surface, as incised wounds and the injuries caused by small foreign bodies are rarely followed by these complications. The condition was first reported by Arlt, as erosion of the cornea. Hansen reported several cases as keratitis bullosa, and ascribed the relapses to repeated although slight injury. Horstmann considered the affection a neurosis similar to herpes ophthalmicus. Grandclément describes the condition as keratalgia traumatica recidiva, but has never observed the formation of vesicles. A terminal neuritis is the probable cause. Cauterization is recommended by Bronner, Nettleship, Nieden, and others. In cases of relapse I have been accustomed to remove the anterior wall of the

vesicle with a small forceps and to allow the defect to heal under an aseptic bandage. Yellow precipitate salve was applied, with massage, only after the epithelium appeared perfectly restored or in case there was no vesicle formation or only a very small bleb. The application of salve and the massage were repeated by the patient every morning on awakening. The results of this treatment have been very gratifying and relapses much less frequent as well as less severe. I have had no occasion to administer quinine or other medicaments internally. I do not think that the neurotic factor is of moment. The mechanical disturbance of the epithelium and its forcible detachment from the underlying layers are the most important points. During the night the conjunctiva of the lids comes into close contact with the loose epithelium and the latter is slightly detached. Transudation from the deeper layer then takes place and a vesicle forms. If the vesicle be a large one, traction so affects the nutrition of the epithelial covering that it breaks down and a defect is formed. If on the other hand the vesicle be a very small one, there is no traction while the eye is open, and the subepithelial exudation is absorbed.

ON SOME CASES OF SO-CALLED COLOBOMA OF THE OPTIC NERVE.

BY DR. PAUL KNAPP, MARBURG.

My clinical material consists of the case of a girl of sixteen whose left orbit, cornea, and lid-fissure were noticeably smaller than the right. Her vision was $\frac{1}{4}$, and there was H of 3 D. Convergent squint had been present for some time. At the inner-lower margin of the pupil there was an indication of a coloboma of the iris. The media were clear. The fundus showed the following peculiar condition. In place of the disk there is a light red oval, measuring 3 P. D. across. This is surrounded by a pigment wall, which is broken at the upper nasal quadrant. There is also an irregular reddish-white boundary. The vessels are divided into two groups which arise from the upper and lower margin of this area, respectively. Ophthalmoscopic determination of re-

fraction showed that this area was an excavation surrounded by a wall, beginning above and becoming deeper downward where it formed a crater 2mm deep. Outward and downward there is a large defect of the choroid, probably an incomplete coloboma, as a few choroidal and fine retinal vessels run over the atrophic area which is surrounded by pigment.

Bach, Goerlitz, Ginsberg, and others have shown that the condition usually designated as coloboma of the optic nerve sheaths, without any clear idea of the developmental defect involved, is really not connected with the nerve or its sheaths and is nothing more than a cystic dilatation of the sclera at the point of entrance of the nerve. There is no actual defect of the sclera but it is undeveloped in the region of the foetal eye-cleft. This occasionally involves the neighboring portion of the papilla, scleral ring, etc., producing the appearance of a coloboma. Preservation of useful vision speaks against any marked anomaly of the nerve itself. Deutschmann ascribes this and similar changes to inflammatory processes during foetal life.

My material also included the eyes of an albinotic rabbit in which ophthalmoscopic examination revealed a marked scleral dilatation about the nerve-head. Sections showed a circumscribed thinning and dilatation of the wall of the globe. The nerve itself was implicated and appeared excavated. In the region of this cyst there is also a coloboma of the choroid. At the upper margin of the nerve there is a new formation of fibro-cartilage. There was no evidence of foetal inflammation or of defective closure of the foetal eye-cleft. Pichler has recently formulated a theory that insufficient amniotic fluid may cause pressure on the eye of the foetus and thus cause developmental arrest with consecutive anomalies in the various tissues of the globe. This would explain coloboma and cyst-formation as well as the congenital microphthalmus noted above.

A CONTRIBUTION TO THE OPERATIVE TREATMENT OF HIGH
MYOPIA.

BY DR. A. SENN, WYL.

The following report is based on 42 needlings, single in 8.

cases, double in 17. The double operation is indicated wherever the refraction of the two eyes is approximately equal. It gives better results as to binocular vision, and is made impossible only by marked differences in refraction or the presence of marked fundus changes in one or the other eye. Of my patients, 7 were males, 18 females. The average age was thirty. The youngest patient was eleven, the oldest, sixty-three. Of my 25 cases, 13 patients and 23 eyes were less than thirty years of age; 12 patients and 19 eyes were between thirty and sixty-three years old. I have purposely made this division of the cases, as the age of thirty has been considered by many ophthalmologists the upper limit of safety in the removal of the lens in high myopia. As to astigmatism before and after operation, about one-half of the eyes had an astigmatism with the rule after operation about equal to that noted before. The other half had astigmatism against the rule of about 1.5 D., an increase of about 0.75 D. Reckoning axes not more than 10° from the vertical or horizontal meridians as straight, inclined axes were found, before operation, 6 times, and after operation, 9 times. Maximum astigmatism, before operation, 3.0 D. in 24 eyes; after operation, 2.5 D. in 14 eyes. The degree of astigmatism might be still further reduced if we knew the exact action of the lance-knife sections. In a general way, sections in the horizontal meridian produce astigmatism against the rule and tend to diminish an existing predominance of curvature of the vertical meridian. Sixty per cent. of my operated cases had cylindrical lenses, averaging about 1 D. The average of the myopia was 18.3 D; the mean corrected vision, about $\frac{1}{2}$, the patients under thirty showing comparatively sharper sight. The average of vision with correction, after operation, was $\frac{1}{3}$ for those under thirty, and $\frac{1}{5}$ for those above, the mean being $\frac{1}{4}$. Contrary to general opinion, elderly myopes have at least as much to gain from the operation as younger ones, but stress should be laid on the necessity of combined treatment, *i. e.*, operation with correction of refraction (including astigmatism of more than 1 D.), and the prevention or combating of fundus changes, such as central choroiditis by subconjunctival injections of mercury. This should also be used before

operation if possible. It seems that the removal of the lens has a favorable influence on the nutrition of the eye aside from any optical improvement. The injections of oxy-cyanate of mercury were effectually used where 2-4% salt solutions showed no action, and atropine, rest-cure, sweat baths, and mercurial inunctions had produced little or no improvement in vision. It is to be noted that apparently inveterate choroidal affections were favorably affected and the vision of an almost useless eye brought up to or beyond that of the other. This may require prolonged treatment which should be persisted in even if there is no visible improvement at the end of the first week. Macular disease of mild degree may disappear completely, although at times the improvement in the ophthalmoscopic picture does not correspond to the increase in vision. Combined treatment certainly seems to widen the scope of the operative procedure besides increasing the probability of a recovery without intraocular complications. With the exception of 3 eyes in patients of over sixty years with partial cataract, in which I performed extraction with flap, after ripening (Foerster) and iridectomy, all the myopic lenses were operated on by dissection followed by linear extraction with the angular keratome. The needling is made very extensive, and cocaine, atropin, and ice-bags used locally in order to postpone extraction, if possible, until the lens has become entirely opaque and can be removed in toto. Irrigation of the anterior chamber is used freely. Secondary membranes are cut with Nicati's or Wecker's scissors. In 2 cases, glaucoma came on after the preliminary needling, but appropriate treatment, ice and mydriatics, soon reduced the tension to normal. In another case plus tension supervened whenever the atropin was stopped long enough for the pupil to contract and bring the iris in contact with the central area of the lens in which there was a protrusion of the opaque masses. It was not necessary in a single case to let out the swollen masses before they were completely opaque. In 8 cases there was incarceration of shreds of capsule or of vitreous in the corneal wound. These were easily severed with a sharp iris hook.

CYST-FORMATION IN THE CONJUNCTIVA.

BY DR. THEODOR BALLABAN, LEMBERG.

Excluding cysticercus and congenital dermoids, simple serous subconjunctival cysts are rare, particularly those of the bulbar conjunctiva. Lymphangiectasies may simulate the above condition, and are not infrequent. While originally ascribed to injury (Arlt), it is now recognized that cysts generally form in pre-existing glands, the type of which can usually be recognized by the character and seat of the new growth.

1. Cysts of the Palpebral Conjunctiva.

These are infrequent, and may be due to rudimentary formations or anomalies of development. They may grow from Krause's or Henle's glands or be due to epithelial inclusion.

2. Cysts of the Fornix Folds.

This form may develop by retention in Krause's glands, occurring in either the upper or lower fold, and may be congenital or acquired. They vary in size from a hemp-seed to a pigeon's egg, and generally contain serous fluid, some coagulated albumin, and epithelial detritus. Another form develops in Henle's glands in consequence of repeated catarrhal inflammation leading to an occlusion of the efferent duct. They may form in places where glands are not usually situated. A large number of the cases of reported serous epithelial cysts probably belong to this category. Dermoids have also been found in the fornix folds.

3. Cysts of the Ocular Conjunctiva.

Normally, the human conjunctiva bulbi contains no true glands whose degeneration could give rise to cysts. If we exclude cystoid scars of the corneal limbus and congenital cyst-formations due to imperfect closure of the foetal eye-cleft, conjunctival cysts on the globe are exceedingly rare. They are almost without exception lymph-cysts due to dilatation of lymph-channels. These may occur at any age and are usually multiple and small. The cyst wall consists of connective tissue with elastic fibres and a single layer of endothelium. A traumatic variety may be formed by epithelial

lements being carried underneath the surface by foreign body or in the course of a wound. Finally, congenital cystic nævi and cysts developing in pterygium have been reported, as well as a peculiar form ascribed by Rogman to adhesions of epithelial (conjunctival) folds, and by Ginsberg to the new formation of glandular tubes with inclusion, on the basis of repeated catarrhal inflammation. A special structure is shown by Parinaud's dermo-epithelioma of the bulbar conjunctiva and by Best's benign cystic epithelioma, which are very similar. These are usually congenital or acquired in early childhood, situated at the limbus, of yellowish-red color, translucent, often lobulated, and easily movable on the underlying tissue. They are made up of epithelial strands with cavities containing granular detritus or large cystic epithelial cells, some of them in a state of mucoid degeneration. I have recently had occasion to examine a cyst of this sort microscopically. It was undoubtedly caused by inclusion of solid epithelial ones into the subepithelial tissue, followed by a breaking down of the central portions and the development of a bore or tube. This central degeneration can be seen in very young epithelial cones in the form of a hydropic change in the cells. Fluid may be absorbed from the neighboring tissues or secreted by the lining epithelium itself and so give rise to cystic dilatation. At all events it is evident that cysts may form in the conjunctiva without the medium of pre-existing glands. In my case the epithelial proliferation was but slightly marked and could not be detected on many of the sections. The cystic nævi described by Wintersteiner were probably formations of this sort. Cysts in pterygia, on the caruncle, the semilunar fold, and other points where normally there are no glands are also probably due to epithelial inclusion on the basis of trauma, mechanical irritation, or catarrhal inflammation.

TELANGIECTATIC FIBROMA OF THE CONJUNCTIVA.

BY DR. RUDOLPH PADERSTEIN, STRASSBURG.

In his article on polypoid growths of the conjunctiva, Elschnig has collected 13 cases of soft fibroma, of which 5 had

been studied microscopically. That clinical examination alone is insufficient to determine the character of these tumors is shown by the following case:

A young girl of seventeen was struck in the right eye by a twig. There was slight pain for a day. Four weeks later a small red mark appeared at the site of injury. This gradually increased in size, without causing any pain. On examination, about six months after the accident, a small, round, bluish-red tumor about half the size of a split pea was seen at the margin of the semilunar fold. It was quite soft, and with the conjunctiva to which it adheres could be moved over the sclera. The growth was excised, and the site of the development soon appeared normal. Examination of the specimen showed that it was composed of soft connective tissue with many capillaries and enlarged lymph vessels. The nucleus of the growth was rich in cells, and surrounded by a capsule. A hyaline, canalized substance was also found in the central part of the growth which, like the capsule, seemed to have some relation to the occurrence of endothelial or epithelial cells. The general structure of the growth resembled that of certain laryngeal fibromata. Radial fibrils and clefts in the hyaline substance of the capsule gave to the latter the appearance of the basal membrane of the respiratory nasal mucosa with its "basal canals" (Schiefferdecker). These canals in the tumor suggest a connection with lymph-channels. The portion of the capsule situated directly beneath the epithelium was of a fibrous structure. Clinically, the growth would be considered a polyp or cyst; and histologically, a soft fibroma. Two features of this group, pediculation and hemorrhage, were absent. The early stage of development may have had something to do with this feature. Growth of the tumor with traction on the subjacent tissue would probably have caused the development of a pedicle, and, considering the vascularity, hemorrhages would probably have appeared before long. The development of angioma on the basis of trauma is well known, and confirmed by the history of this case.

ENDARTERITIS OF THE CENTRAL ARTERY OF THE RETINA WITH
CONCREMENT-FORMATION.

By DR. Z. GALINOWSKY, TULA, RUSSIA.

That obstruction of the central artery of the retina is by no means invariably due to embolism but is frequently caused by thrombosis with or without previous disease of the vessel wall, was first brought to the attention of ophthalmologists by Mauthner, Loring, Nettleship, later by Noyes and Priestley Smith, and of recent years by Haab and his pupils, as well as by Michel. It appears that proliferating endarteritis plays a prominent rôle, particularly in those cases in which complete obstruction of the vessel was preceded by transitory attacks of blindness. Michel claims that this factor alone without the formation of a thrombus may suffice to occlude the lumen of the central artery completely. Reimar comes to similar conclusions, and considers prodromata of obscurations pathognomonic of endarteritic proliferation. I have recently had occasion to examine a case in which the diagnosis of embolism had been made, and in which microscopic examinations showed that complete occlusion of the lumen was caused, not by thrombosis, but by calcification of the proliferating mass. Immediately behind the lamina cribrosa a marked proliferation of the intima of the central artery was found, about 1mm thick. This developed under the epithelium, spread around the wall of the vessel, and gradually reduced the calibre of the artery to $\frac{1}{2}$. The proliferation consisted of large cells rich in protoplasm, and of concentrically arranged fibres. A membrane of double contour formed a boundary line toward the narrowed lumen. At the point of greatest narrowing, outside the lumen of the vessel and enclosed in the cells of the proliferation, a chalky concretion was found. At the point of greatest diameter of this formation neither cells nor intima can be seen, and the vessel is enlarged to double its diameter. In front of the concrement, the lumen of the vessel, much narrowed, can again be detected, but the proliferation can be traced up to the lamina cribrosa. Peripherally the vessel contains some blood. As no blood could reach the retina through the central artery,

it is probable that a communication existed between the retinal circulation and the vessels of Zinn's plexus.

The clinical diagnosis of embolism of the central artery should not be made on the basis of the ophthalmoscopic examination alone. The general condition, and the state of the heart should be taken into consideration. In my case there was general rigidity of the arteries and a history of apoplectic attacks which strongly suggested local vascular disease. It must be conceded that a bit of degenerated vessel wall might be swept into the general circulation and form an embolus, or that a heart-thrombus formed on the basis of a valvular lesion might become disintegrated and be carried into the central artery of the retina, but such occurrences must be unusually rare. A further indication of vascular disease is given by the narrowing of the lumen of small vessels in the optic nerve and its sheaths, with a thickening of the elastica. Sudden blindness was followed by a temporary and partial recovery of vision. This was, perhaps, due to some shrinkage of the proliferating mass, but more probably to an increase of blood pressure and the relief of local spastic contraction of the occluded vessel. Final blindness was due not only to occlusion by proliferation, but to the chalky degeneration of the tissue. In small vessels which have no nutrient capillaries (*vasa vasorum*) this change seems to affect the intima first and most markedly. The region of the lamina cribrosa seems to be the favorite site for vascular disease. This depends on the circulatory conditions in the interior of the globe, the marked turns made by the vessels at the point of entrance of the nerve, and the mechanical traction of this segment when the eye is moved.

The differential diagnosis between thrombosis, embolism, and endothelial proliferation may be a very difficult matter if the histologic examination is made a long time after the occlusion of the vessel. Changes in the vessel wall, degeneration, contraction, organization of the obstructing mass, and reactive changes about it may entirely obscure the picture. A mass sufficiently large to cause an irregularity in the external wall of the vessel can, however, hardly be due to embolism, as it could not possibly have been carried into this position by the mere force of the blood-current.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

BY MR. C. DEVEREUX MARSHALL.

THURSDAY, MARCH 14, 1907. PRIESTLEY SMITH, F.R.C.S.,
PRESIDENT, IN THE CHAIR.

Dr. ROCKLIPPE read notes of a case of thrombosis of the cavernous sinus associated with septic meningitis, which originated from a septic sore on the lip. The patient was a fish-dock laborer whose general health, but for bronchitic attacks, had been satisfactory. He was first seen on November 18th last and had proptosis of the right eye. Five days previously a small spot appeared on the upper lip. He picked it and eventually pricked it with a pin. The lip and face became swollen and he then applied a linseed-meal poultice. Four days later he was admitted into the infirmary. He became delirious, and a diagnosis of thrombosis of the cavernous sinus was made. Afterward lumbar puncture was done. He died on November 20th, being two days after admission, and seven days after the spot appeared on the upper lip.

At the autopsy the meninges about the right cavernous sinus were covered with lymph. The right cavernous, the transverse, and part of the left cavernous sinus were thrombosed. The orbital tissues on the right side were inflamed and swollen, but there was no pus.

Dr. ROCKLIPPE also read notes of four cases of sympathetic irritation occurring after eighteen, twenty-two, twenty-eight, and fifty years respectively.

In two of these cases a foreign body was found, and the third case probably contained a foreign body, a piece of stone.

The injury in the fourth case was a punctured wound. Considerable ossification was present in three of the cases.

Mr. A. R. BRAILEY read a paper on *cysts of the pars ciliaris retinae*. He stated that these structures had frequently been mistaken for sarcomata of the ciliary body clinically, but little was known of their pathology, though their study might throw some light on the secretion of the aqueous. They were found in such a variety of conditions that he was only able to classify them according to their apparent mode of origin. Two changes which played an important part in the origin of some varieties limited to the cells of the unpigmented epithelium were: multiplication of the cells, and vacuolation of the cell bodies. This proliferation was most frequently found in senile eyes, and was commonly associated with hypertrophy of the ciliary processes. The cells of the pigmented layer appeared to play a more passive rôle, and even in cysts arising by simple detachment of the epithelium, it was the unpigmented layer alone which was affected, the adhesion between the pigmented epithelium, and the underlying ciliary body being a peculiarly intimate one. The different modes of origin appeared to be: (1) Detachment of the non-pigmented epithelium. (2) Proliferation of the non-pigmented epithelium cells with the formation of a cavity arising either by simple separation of the cells, or by their vacuolation and destruction. (3) Proliferation and union of the cells of adjacent processes, leading to a portion of the posterior chamber being shut off from the remainder.

The number of the specimens was too small for him to come to any conclusion as to the relative frequency of these varieties. The contents of the cysts was usually lost during the preparation of the specimen, but when present it consisted of a deeply-staining, homogeneous, coagulable fluid.

SYSTEMATIC REPORT OF THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1906.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the Assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and Others.

Translated by Dr. PERCY FRIDENBERG.

Sections I.-III. Reviewed by PROF. C. HORSTMANN,
Berlin.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

1. OPPENHEIMER, E. H. *Compend of glassing. Graefe-Saemisch Handbuch*, etc. Second edition, Pt. II., vol. iv.
2. VIRCHOW, HANS. *Microscopic anatomy of external tunics of the eye and of the lids. Graefe-Saemisch Handbuch*. Second edition, Part I., vol. i.
3. GREEFF, R. "Eye." *Orth's Text-Book of Special Pathological Anatomy*. Part 12.
4. HAAB, OTTO. *Atlas of external diseases of the eye. Lehmann's Med. Hand-Atlases*, xviii.
5. ISCHIREYT. *Clinical and Histological Studies of Tumors of the Eye*. Berlin, 1906.
6. HOSCH. *Ophthalmological miscellanies. Arch. f. Augenh.*, liv., p. 156.
7. v. HIPPEL. *Further contributions to the study of rare malformations. Graefe's Arch. f. Ophth.*, lxiii., 1, p. 1.
8. STRAUB, M. *Text-Book of Diseases of the Eye*. Leyden, 1906.
9. KERN and SCHULZ. *Test-Types*. Second edition, Berlin, 1906.
10. HEIMANN, E. *Test-Types for Children*. Second edition, Berlin, 1906.

11. ROTH, A. *Visual Tests. Quiz Compend.* Third edition, Leipsic, 1906.
12. ROTH, A. *Confusion Tests.* Two Plates with Text. Leipsic, 1906.
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14. HIRSCHBERG, J. Contribution to the history of the cataract operation. *Ibid.*, p. 133.
15. LIEBREICH, R. Influence of visual defects on painting. *Muenchn. Kunststech. Blaetter*, 1906, No. 16.
16. POULLAIN, G. Retrospective determination of the refraction of Jean Baptiste Porta. *Rec. d' oph.*, xxviii., p. 1.
17. TRUC, H. *The Evolution of Ophthalmology at the School of Montpellier.* Montpellier, 1905.
18. PPALZ. First aid in injuries of the eye. *Deutsche Militaer-Aerztl. Ztg.*, 1906, No. 4.
19. JUNIUS. *Decisions of the Imperial Insurance Department of Importance to Oculists.* Berlin, 1906.
20. FEILCHENFELD, W. Earning capacity in injury to the eye. *Zeitsch. f. Augenh.*, xv., 2, p. 216.
21. BOCK, E. *Fifteenth Report of the Eye Department, County Hospital at Laibach, 1905.* Laibach, 1906.
22. BOUVIN, M. J. *Report on the Eye Hospital at Gravenhagen for 1905.* Gravenhagen, 1906.
23. KNAPP, H. *Thirty-sixth Annual Report New York Ophthalmic and Aural Inst.*, Oct. 1, 1904, to Oct. 1, 1905.
24. PARSONS, J. HERBERT. Ehrlich's theory of immunity in its relationship to ophthalmology. *Royal London Ophthalmic Hospital Reports*, vol. xvi., part 4.
25. USHER, C. H., and FRAZER, HENRY. An analysis of a series of consecutive conjunctivitis cases seen in Aberdeen. *Royal London Ophthalmic Hospital Reports*, vol. xvi., part 4.

In his sketch of the science and art of fitting glasses, OPPENHEIMER (1, Compend of glassing) reviews, first, the manufacture of lenses and frames, the construction of spectacles and eye-glasses, construction and use of monocles, reading glasses, lorgnons and lorgnettes. A second chapter deals with the different varieties of eye-glasses in regard to their application, and the principles of fitting and adjustment are detailed.

HANS VIRCHOW (2, Microscopic anatomy of external tunics of the eye and of the lids) has taken charge of the chapter of microscopical anatomy of the external covering of the eye and lids which was the work of Waldeyer in the first edition of the Graefe-Saemisch handbook. The two last issues contain the

microscopical anatomy of the cornea, and deal with that of the corneal epithelium and of the cornea propria more particularly. The chapter has been entirely revised and completed. All the latest investigations are considered in extenso.

GREEFF's (3, "Eye") description of the pathological anatomy of the eye deals in the last issue with diseases of the lids and lachrymal apparatus, completing this excellent work. The author's own investigations and complete survey of the literature make this by far the best treatise on the subject which has thus far appeared.

HAAB's (4, *Atlas of external diseases of the eye*) atlas of external diseases of the eye appears in the third edition with numerous additions and improvements, and many new illustrations in color and black and white. A proof of its deserved popularity.

ISCHREYT (5, Clinical and histological studies of tumors of the eye) reports a number of clinical observations and histological investigations. Of the 20 cases reported, 17 were tumors of the eye and its appendages, while the remaining 3 were more or less closely situated. There were 3 cases of epibulbar carcinoma, 2 of xeroderma pigmentosum with tumor formation on the lids, 1 of primary carcinoma of the palpebral conjunctiva, 5 tumors of the lid commissure, 3 choroidal sarcomas, 1 carcinoma of a tarsal gland, 1 luetic tarsitis, 3 choked disk following orbital tumor, and 1 luetic mucous papule simulating tumor of the limbus.

HOSCII (6, *Ophthalmological miscellanies*) reports on cyclitic membranes, lipo-dermoid of the conjunctiva, fat-embolism of the retina, and on the etiology of zonular cataract.

v. HIPPEL (7, *Further contributions to the study of rare malformations*) describes congenital teratoma of the orbit, congenital bilateral anophthalmia, with orbital encephalocele, cryptophthalmos, epibulbar dermoid, coloboma of the lid, and microphthalmos.

STRAUB's (8, *Text-book of diseases of the eye*) handbook completes his two works on examination and therapeutics. The pathology of the eye is given in full. Refraction and accommodation, disturbances of light- and color-perception, then the diseases of the various tissues, and, finally, functional diseases are considered.

HEIMANN's (10, Test-types for children) test-types present a black hand with outstretched fingers on a white ground. The juvenile patient is to say in what direction the hand points. It is not well adapted for quantitative determination of vision.

ROTH's (11, Visual tests) test-types consist of two plates of Snellen's pot-hooks and are intended to detect simulation of visual diminution. The plates are hung side by side, and the lines of figures are at the same height. Reading over from one card to the other brings in a line of different size.

LIEBREICH (15, Influence of visual defects on painting) shows by a study of Turner's paintings that he was affected with lenticular opacities during the last twenty years of his life. Other painters show the effect of astigmatism and of color blindness in their technique and choice of pigments.

POULLAIN (16, Retrospective determination of the refraction of Jean Baptiste Porta) claims that the discovery of the Galileian telescope by Porta was induced by his hypermetropia. Kepler's invention of the astronomical telescope was aided by myopia.

PFALZ (18, First aid in injuries of the eye) urges immediate grafting of epidermis in cases of injury of the lids. Not a millimetre should be left to cicatrize. Burns of the lids, due to explosion, generally look worse than they are, except in case of laceration by foreign bodies. Pain is best controlled by a salve of airol, 1%, and holocaine, 1%. Powder grains imbedded in the cornea and conjunctiva are to be removed only if they are quite superficial. Lime burns are to be treated with free irrigation. Contusions of the globe require pressure bandage, bed rest, and ice applications. Penetrating wounds are to be closed by scleral suture, and a bandage applied with oxy-cyanide of mercury, 1:5000. Iris prolapse with incarceration is the only injury requiring immediate operative interference.

FIELCHENFELD (20, Earning capacity in injury to the eye) finds that in many walks of industrial life loss of one eye and deterioration of vision do not interfere with full earning capacity. Each case must be studied individually, and a schematic valuation of loss of one eye is not advisable.

The difficulty of competing with normal individuals for employment, and the greatly increased seriousness of a second accident or of any further diminution of vision in the only remaining eye must, however, be taken into consideration, and compensation allowed for these factors.

BOCK (21, Fifteenth report of the eye department, County Hospital at Laibach) treated 4555 patients, 173 in institutions. There were 13 cataract operations, 15 iridectomies, 48 squint operations.

KNAPP (23, Thirty-sixth annual report New York Ophthalmic and Aural Inst.) treated 10,560 cases, performed 325 operations, 41 on the iris, 85 on the lens, and 45 on the muscles.

In this long and learned paper PARSONS (24, Ehrlich's theory of immunity in its relationship to ophthalmology) goes into the whole question of immunity. He describes Ehrlich's theory, and refers to the work which has been done on the subject. Any one who is interested in the actions of toxins and anti-toxins, and the theory on which they perform their work, cannot do better than to consult this paper, for it will save him hours of searching of original papers, mostly in the German language. It is however far too complicated to give an abstract which would be intelligible to those who know little or nothing of the subject.

Parsons then applies the theory to such cases as sympathetic ophthalmia, and brings forward strong evidence against the ciliary nerve theory of the disease. He discusses the action of bacteriolysins, opsonins, agglutinins, precipitins, and cytotoxins. The conjectures of Römer are given as to the causation of senile cataract deduced from the side-chain theory.

He finally expresses the opinion that the work which has been done on cytotoxins in general is the weakest part of the structure which has been built on the basis of the side-chain theory. Further researches will however, he thinks, eventuate in the discovery of some general principle underlying these complex problems.

USHER and FRAZER (25, An analysis of a series of consecu-

tive conjunctivitis cases seen in Aberdeen) record an investigation upon the clinical and bacteriological aspects of a considerable number of cases of conjunctivitis.

As nutrient fluids, agar tubes were used in which was some body fluid—either ascitic, ovarian, or hydrocele, and in all these fluids were obtained from 9 individuals.

Of 3527 eye cases seen in 1905, 820 were cases of conjunctivitis, and this amounts to 23.24% of the eye cases.

Of the 820 cases, 310 proved to be due to the Koch-Weeks bacillus. These cases are carefully analyzed, and the clinical features are described.

Phlyctens were noted in 53 of the total number of cases, and in 36 the staphylococcus was also present. In 5 the Koch-Weeks bacillus only was found, and in 31 cases it was found in association with some other organism.

Several of the exceptional cases are fully described.

The medium found to be most suitable for these organisms was ovarian fluid. It should be recently obtained, and should contain 5 to 7% of albumin, and also blood derivatives, the presence of which can be proved by obtaining a spectrum of haemochromogen. After being kept for six months, although sterile, ovarian fluid does not give satisfactory results with the Koch-Weeks bacillus.

Two hundred and seventy-four of the 820 patients examined were cases of diplobacillary conjunctivitis, due to the Morax-Axenfeld diplobacillus. In 34.7% of cases diagnosed as angular conjunctivitis, this bacillus was present, and the conclusion drawn was that angular conjunctivitis occurs in about one-third of all cases due to the diplobacillus, and when angular conjunctivitis is present, it is almost pathognomonic of the presence of the diplobacillus.

In the same series of 820 cases, 21 were diagnosed clinically as gonorrhœal. Eighteen of these were found to be due to the gonococcus, one was due to the diplobacillus, and two to other forms.

Only one case of tuberculous conjunctivitis was seen, and that occurred in a girl aged seventeen and the diagnosis was clinched by inoculation. One case also was due to diphtheria.

One hundred and fourteen cases were left unclassed for

various reasons, when the condition present made the isolation of a specific organism unlikely.

There is no means of clinically diagnosing cases due to pneumococcus.

Trachoma was not met with in this inquiry.

Cases due to the Koch-Weeks bacillus occurred most frequently in the spring, while the diplobacillary cases were more numerous in the autumn, and, also, the greater the rainfall, the fewer the cases, and vice versa. Charts and photomicrographs accompany the paper.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND TREATMENT.

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28. v. MICHEL, J. Occurrence of amyloid in the eye and ocular vessels. *Zeitsch. f. Augenh.*, xv., p. 13.
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41. HERMJOHANNKNECHT, B. On intraocular foreign bodies. *In. Diss.*, Giessen, 1906.
42. VOSSIUS, A. The importance of examination of the pupil in

- the diagnosis of unilateral blindness from lesion of the optic nerve. *Med. Wochenschr.*, 1906, No. 1.
43. PERGENS, E. Studies in visual acuteness. *Ann. d'oculist.*, cxxxv., pp. 11, 77.
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 45. COLLIN, R. Clinical test of color sense. *Zeitsch. f. Augenh.*, xv., 4, p. 305.
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 47. LANGE, O. *Diagnosis and treatment of external diseases of the eye*. Halle, 1906.
 48. SCHMIDT-RIMPLER, H. Mercury treatment in ophthalmic medicine. *Deutsche med. Wochenschr.*, 1906, No. 1.
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 51. LIPPINCOTT. Intraocular irrigation. *Ophthalmology*, 1906, p. 226.
 52. BECK, A. On subconjunctival salt-injections. *Arch. f. Aug.*, liv., 4, p. 368.
 53. STARGARD. Necrosis after suprarenin injections. *Klin. Monatsbl. f. Augen.*, xliv., 1, p. 213.
 54. REUCHLIN, H. Experiences with Koch's tuberculin. *Ibid.*, p. 358.
 55. RENNER. On Bier's hyperæmia in eye diseases. *Muench. med. Wochens.*, 1906, 2.
 56. GROSSE. Asepsis of instruments, bandage-materials, and drugs in ophthalmic surgery. *Ibid.*, p. 219; *Klin. Monatsbl. f. Aug.*, xliv., 1.
 57. FICK. Ciliary neurotomy without injury to the optic nerve. *Zeitsch. f. Augenh.*, xv., p. 51.
 58. TUERK. The technique of the magnet operation. *Arch. f. Aug.*, liv., 2, p. 180.
 59. SCHOLTZ, K. Determination of the value of jequiritol by animal experiment. *Ibid.*, lv., 3, p. 209.
 60. SUKER, G. F. Two cases of intraocular tumor in which the trans-illuminator was misleading. *Oph. Record*, Nov., 1906.
 61. LEWIS, E. P. A practical method of abolishing the cause of one-quarter of the unnecessary blindness in the United States. *Jour. Amer. Med. Asso.*, April 28, 1906.
 62. VERDERAME. Subconjunctival injections. *Zeitschr. f. Aug.*, xv., 4, p. 289.
- ALBRAND and SCHROEDER (26, The pupil post-mortem) describe the pupillary reaction after certain forms of poisoning, post-mortem changes, the direct and indirect action of poisons

on the pupil, and the combination of toxic and lethal pupillary reaction. The mydriatic and meiotic action of poisons is detailed. The pupil in alcohol intoxication, asphyxia, and collapse is then taken up. Results of animal experiments and reports of clinical cases are given. The last chapter describes pupillograms, the pupil in death by decapitation, the cause of premortal dilatation, and the cadaveric pupil as it varies under high and low temperatures.

HESS and ROEMER (27, Experimental investigations on anti-bodies for the retinal elements) proved that the normal sera of various species contain anti-bodies for the rods and cones not only of other varieties but even for the same individual.

V. MICHEL (28, Occurrence of amyloid in the eye and ocular vessels) examined the eyes of a girl of eighteen in whom a double, almost complete hemorrhagic detachment of both retinae had been observed eighteen hours before death. Autopsy showed contracted kidney with extreme amyloid degeneration. The same reaction was found in the chorio-capillaris, retinal vessels, and those of the nerve. Local amyloid may be found without constitutional degeneration in scars, staphylomata, and ribbon-shaped opacity of the cornea; as a result of hemorrhages into the vitreous; in the walls of choroidal and retinal vessels in phthisis bulbi.

RUHWANDEL (29, Extensive remains of foetal eye-vessels) describes conditions in the eye of a man of thirty-one which are taken to represent remains of the foetal vascular system. The hyaloid artery was persistent not only in its trunk but also in a large part of the original zone of distribution on the posterior capsule of the lens.

According to OGAWA (30, Experimental study of wounds of the vitreous) a wound of the vitreous cannot be healed. It is a division of continuity which cannot be restored. There is no evidence of regeneration or of cicatrization or of proliferation of blood-vessels. Strands never form in the vitreous. The puncture is filled with fluid vitreous only. The walls of the wound canal consist simply of neighboring vitreous tissue which is mechanically thickened or condensed. This condensation may become looser in time.

Leucocytes which immigrate into the vitreous after injury gradually become less numerous.

PIER (31, Cases of congenital and acquired pathological pigmentation of the eye) reports 5 cases of albinism, a case of pigmented corneal scar with incarcerated iris, following injury, 4 cases of pigmentation of the entire bulbus after trauma, 4 cases of pigmentation of the sclera after penetration by the nib of a steel pen, and 3 cases of peculiar discoloration following scleritis.

The investigations of SCHIRMER (32, Experimental and clinical study of phthisis bulbi) go to show that inflammatory disturbances of circulation are the cause of lowered tension often observed a few hours after the onset of acute inflammation. Aqueous of high albumin concentration is secreted in very small quantity. This inflammatory change in vascular secretion may last for months with lowered tension and then disappear, when tension returns to normal. In cases terminating unfavorably, so many ciliary vessels are destroyed that not enough are left to secrete sufficient intraocular fluid. The aqueous may then be of normal concentration and albumin percentage but it is deficient in quantity. Intraocular tension is permanently reduced, the capsule of the globe is no longer under elastic tension, and the tissues contract of their own accord and become thickened: non-irritative phthisis. If a larger number of vessels escape destruction, highly concentrated aqueous is secreted as before, in too small a quantity, and phthisis dolorosa results.

VOGT (33, Studies on the deleterious action of anilin colors on the eye) finds that various anilin colors have different effects on the tissues of the eye, depending on their chemical composition. Acid, neutral, and mordant colors, and those which are insoluble in water, cause little or no irritation when introduced into the conjunctival sac of the rabbit in amounts of 5-10mg. Basic pigments in similar quantities cause intense irritation which may go on to panophthalmitis. This is proportional to the basicity and does not depend on the mineral acid of the color-salt; increases with the solubility of the pigment in the fluids of the eye. Irrigation of the conjunctival sac with 5-10% solutions of tannin neutralize even the most active anilin colors while water and solutions of salt,

boric acid, bichloride, or soda bicarbonate seem to do more harm than good.

FERENTINOS (34, Visual disturbance caused by observation of a solar eclipse) describes the fundus conditions of 5 patients who had watched a solar eclipse with unprotected eyes, and suffered diminution of vision in consequence. At the centre of the macula a red spot was seen of the size of a lentil, in which there was a gray dot of the size of a pin-head. Central scotoma and retinal asthenia were noted. In the course of time all these symptoms disappeared.

DRAKE-BROCKMAN (35, Is the use of electric light injurious to the human eye?) reports 6 cases which show that electric light as it is ordinarily used for interior illumination is a source of sensitiveness of the eye and may be dangerous and injurious. In all these cases the symptoms disappeared after oil or gas lamps were substituted for electricity. We are still ignorant of the kind of light-rays which cause the trouble.

According to KAHN (36, The influence on intraocular tension of extracts of chromatin tissue), intravenous injections of adrenalin raise intraocular tension more than 50% above its original height. This is due to passive dilatation of the vessels of the eye depending on contraction in the general vascular system and increase of blood-pressure. The latter is lowered sooner than the tension within the eye.

SPEAR (37, Photophobia, a nasal reflex) considers the possibility of hyperæsthesia of the nasal mucosa being a cause of photophobia, and cites cases to prove this theory.

RAMSAY's (38, Hydrophobic head tetanus due to contused wound of the external canthus) patient was a woman of twenty-three who had been struck on the right eye with a walking-stick four days previously. There was a suppurating wound near the external canthus with chemosis of marked degree. A few days later trismus set in which gradually got worse. All the muscles of the injured side of the face were paralyzed. Tetanus bacilli in large numbers were found in the wound. Anti-tetanus serum was administered and sleep produced by large doses of chloral. After the third dose of anti-toxin the condition began to improve and the patient finally got well. Most of these cases end fatally, and the

favorable result in this case was probably due to the serum treatment. Altogether, 150 c.c. were given, in 7 doses. In the course of about 5 weeks, 3000 grains of chloral were taken, about 150 grains being given every 24 hours for the first 16 days.

ORLOW (39, The relation of the poison of rabies to the tissues of the eye) studied the action of rabies poison on the tissues of the eye by animal experiments on rabbits and guinea-pigs. Different tissues of the eye were used to form an emulsion for inoculation, the animals from which these tissues were taken having been killed by inoculation with artificially isolated tetanic virus. The toxic emulsion was introduced under the meninges of animals. Retina and vitreous were found to be as virulent as the medulla oblongata. The local changes in the eye preceding death by rabies are in the nature of chorio-retinitis. The virus is found in the retina, the vitreous, optic nerve, and aqueous.

MARSHALL (40, Meningitis following enucleation) energetically opposes the view of many ophthalmologists that it is dangerous to remove an eye in the stage of florid panophthalmitis. He claims that the meningitis which has been observed in such cases is not due to the enucleation, but to the fact that it had not been performed in time. Meningitis had already developed although its symptoms were not pronounced or not recognized. He cites cases in which death took place of meningitis although no operation was performed, but has not seen a single case in his long practice in which death could justly be attributed directly to enucleation. The great majority of patients would get well without any complications if the eyes were removed in time. Early operation is imperative and should be performed as soon as it is evident that there is pus in the interior and that there is no probability of regaining useful vision.

HERMJOHANNKNECHT (41, On intraocular foreign bodies) gives statistics from the eye-clinic at Giessen of 58 patients, 62 eyes, treated for intraocular foreign bodies. In 4 cases both eyes were injured by dynamite or powder explosion. The patients were mostly miners and stone-quarry workers. Iron and steel splinters were most frequent. The foreign body was

found in the vitreous 25 times. In 20 cases extraction was successful; in 14, the globe had to be enucleated or eviscerated, and in 6 cases phthisis bulbi resulted.

Vossius (42, The importance of examination of the pupil in the diagnosis of unilateral blindness from lesion of the optic nerve) calls attention to the examination of the pupil in case of monocular blindness following injury of the optic nerve. The pupil of the blind eye dilates ad maximum when the sound eye is covered, and contracts when light enters the good eye. This together with dilatation of the pupil of the blind eye in spite of light stimulus proves that light conduction by way of the nerve of the injured eye is completely abolished.

PERGENS (43, Studies in visual acuteness) gives a historical review of the literature on visual acuteness and the tests for it. The camera obscura was known before Porta, who is generally believed to be the inventor. Before Scheiner, Aranyi demonstrated the reversal of images on the retina, and both probably had this phenomenon shown them in Rome by an unknown scientist. Keppler was antedated by Plater who in 1583 gave a correct demonstration of the refraction of light rays in the eye.

COLLIN (45, Clinical test of color sense) recommends colored glasses illuminated by an electric lamp and attached to the perimeter, for the determination of central color perception and the color fields.

SCHMIDT-RIMPLER (48, Mercury treatment in ophthalmic medicine) uses mercury in ophthalmic therapeutics in the form of inunctions or of intra-muscular injections of bichloride, in all syphilitic affections and especially in diseases of the iris, irido-cyclitis with vitreous opacities, and choroiditis.

HIRSCII (49, Painless hypodermic injections of mercury) recommends for hypodermic injections of mercury, a preparation which contains 1% hydrarg. oxycyanate and 0.5% acoin in aqueous solution. This is free from pain and the point of injection remains free from tenderness and irritation.

According to GELPEK (50, On the therapeutic value of yellow oxide ointment) yellow oxide ointment has a double action, being both an antiseptic and an absorbent.

Its application is especially desirable in those forms of blepharitis which are complicated with chronic catarrh of the conjunctiva, as well as in the terminal stages of phlyctenular conjunctivitis. It is contra-indicated in case the cornea is also affected in phlyctenular and in all other forms of keratitis. In episcleritis it is of value. Gelpke warns against using this medicament in a stereotyped way without individualizing, and believes that much harm is done by its too general and promiscuous use.

LIPPINCOTT (51, *Intraocular irrigation*) traces the history of irrigation from St. Yves, who in 1722 washed out the anterior chamber for hypopyon, to its renascence due to McKeown and Inouye. France and America have taken up the procedure as a valuable aid in the removal of cortical remnants in cataract operation. It may still be employed to advantage in hypopyon, complicated, as Lippincott at times has found it, by small non-metallic foreign bodies such as coal or shale which have penetrated into the anterior chamber in mining accidents. Even when no foreign body is present, irrigation is a valuable aid in the determination of that fact. In cataract operation, the advantages of irrigation are those of a thorough, prompt cleansing of the anterior and posterior chambers and the lips of the wound of cortical matter, blood, air bubbles, and shreds of capsule, by absolutely gentle means. It clears the field and so conduces to accurate capsulotomy. The pupil becomes clear after extraction, and the patient is encouraged. The iris is stimulated to return to its normal position. It makes prolonged stroking and pressing on the cornea unnecessary and will re-establish the anterior chamber and the form of the corneal dome in case of collapse or inversion of that membrane. The remote advantages are at least as important. Rapid union is favored by accurate coaptation of the wound edges, there is less tendency to prolapse, and to capsular opacities, so that secondary operation is not so often required. It diminishes the danger and severity of uveal inflammation due to retained matter. It is not necessary when the lens emerges in its capsule, and is contra-indicated in actual or threatened escape of vitreous. Its effectiveness is best demonstrated when cortex is soft or unduly adherent, in traumatic and immature cataract, myopic choroidal cataract,

and high myopia. Physiological salt solution is almost universally acknowledged to be the best fluid for irrigation. Lippincott has devised a fountain syringe with pen-holder handle. It is easily disinfected, does not carry air bubbles into the anterior chamber, is simple, controllable with one hand, and the amount and force of the fluid can be regulated.

BECK (52, On subconjunctival salt-injections) found that subconjunctival injections of salt-solution were followed by decided improvement in 4 out of 5 cases of vitreous opacities, 7 out of 8 of central choroiditis, in 1 case of injury, 1 of sympathetic ophthalmia, and 1 of detachment.

STARGARD (53, Necrosis after suprarenin injections) injected a solution of cocaine-adrenalin, containing 7.5 parts of a 1% solution, and 2.5 parts of a 1:1000 solution, respectively, in two cases. The entire area of infiltration became necrotic.

REUCHLIN (54, Experiences with Koch's tuberculin) claims that a typical reaction to small amounts (1-3-5mg) of old tuberculin in a patient whose eye disease is suspected to be dependent on tuberculosis proves the presence of an active tuberculous process, even if there is no evidence of tuberculosis elsewhere. There was a positive reaction to tuberculin in 9 cases out of 11 of phlyctenular conjunctivitis, typical reaction in 4 more cases of scrofulous ophthalmia, and in 6 cases of typical parenchymatous keratitis. In 2 of these, tuberculin treatment was employed with success, and in 5 cases of choroidal disease. Probatory injections were made in 30 cases of disease of the iris and ciliary body, with a positive reaction in 27.1; eighteen were treated with injections, 14 successfully. Considering the excellent results in these cases, the author urges more general use of systematic tuberculin injections, which are entirely harmless although they require much patience on the part of both physician and patient.

RENNER (55, On Bier's hyperæmia in eye diseases) used Bier's congestive hyperæmia in 5 cases of parenchymatous keratitis affecting individuals up to forty years of age, with marked improvement in all. The result in a case of serpent ulcer was satisfactory. On the other hand, there was no

notable improvement in cases of eczemato-phlyctenular and catarrhal ulcer, or in old corneal ulcers without vascularization.

GROSSE (56, Asepsis of instruments, bandage-materials, and drugs in ophthalmic surgery) recommends his universal steam sterilizer for asepsis of instruments, bandage material, and solutions for eye operations.

FICK (57, Ciliary neurotomy without injury to the optic nerve) reports 2 cases in which cyclitic irritation was arrested by ciliary neurotomy without implication of the optic nerve.

TUERK (58, The technique of the magnet operation) advises the use of large, powerful magnets acting at a distance from the eye in case of metallic foreign bodies, particularly as long as they are located in the depths of the eye.

SCIOLITZ (59, Determination of the value of jequiritol by animal experiment) shows experimentally that very small amounts of jequiritol-serum neutralize jequiritol completely, prevent or cure jequiritol ophthalmia, and exert a protective action for a long time.

SUKER (60, Two cases of intraocular tumor in which the trans-illuminator was misleading) demonstrates the fact that this instrument cannot be depended upon in diagnosis of intraocular tumors when the vitreous is permeated with blood. He presents two specimens in one of which the trans-illuminator failed to show the slightest shadow on account of the presence of blood.

ALLING.

LEWIS (61, A practical method of abolishing the cause of one-quarter of the unnecessary blindness in the United States) offers a strong plea for the general dissemination of knowledge concerning the dangers of ophthalmia neonatorum, and suggests that the health department of every State arrange for the free distribution of properly prepared solutions of silver nitrate with complete directions for their use.

ALLING.

VERDERAME (62, Subconjunctival injections) warns against subconjunctival injections of acuin and of mercurial salts on account of the irritation, which may even cause necrosis and obliteration of the conjunctival sac. In exudative inflamma-

tion, subconjunctival injections of salt-solution have an excellent effect in promoting the absorption of exudates. They may be used in 2-10% solution without causing any damage.

III.—REMEDIES AND INSTRUMENTS.

63. HINSHELWOOD. Argyrol in ophthalmic practice. *Ophthalmoscope*, 1906, No. 1.
64. SPENGLER. A danger of argyrol. *Zeitsch. f. Augenh.*, xv., p. 44.
65. STEINKUEHLER, M. Protargol. *Wochensch. f. Ther. u. Hyg. d. Aug.*, 1906, No. 6.
66. BYLSMA. Defense of protargol. *Med. Weekbl.*, 1906, March 23.
67. MEYER. Further report on Crede's silver treatment. *Zentralbl. j. prakt. Augenh.*, xxx., p. 433.
68. SAGER D. S. The action of formaldehyde on the cornea. *Ophthalmoscope*, 1906, Feb.
69. BINDER. Use of aristol in ophthalmology. *Ther. d. Gegenw.*, 1906, No. 6.
70. KRAUSE, R. Action of chrysarobin on the eye. *Zeitsch. f. Augenh.*, xv., 3 p. 233.
71. TERSON. Guaiacol in ophthalmic practice. *Ophth. Klinik*, 1906, 2.
72. NEUSTAETTER. Incrustation by hydrogen peroxide. *Ophth. Klinik*, *ibid.*
73. KOSTER. Potassium chlorate in ophthalmic practice. *Tydsch. voor Geneesk.*, 1906, No. 6.
74. SCRINI. Local Anæsthesia with Alkaloids in Oily Solution. Paris, 1906.
75. LIEBL. Local anæsthesia with novocain-suprarenin. *Muenchn. med. Wochensc.*, 1906, No. 5.
76. FOERSTER. Dionin and atropin. *Wochens. f. Hyg. u. Ther. d. Aug.*, 1906, p. 145.
77. DEUTSCHMANN. Use and abuse of atropin. *Med. Woche.*, 1906, Nos. 5, 6.
78. HINSHELWOOD. Dionin in ophthalmic practice. *Brit. Med. Jour.* '06, No. 2367.
79. GEBB. Novocain and its anæsthetic action on the eye. *Arch. f. Aug.*, iv., p. 122.
80. TRUC. Alypin in ophthalmic practice. *Rev. gén. d'opht.*, xxv., p. 97.
81. STEPHENSON, S. Note on alypin, a new anæsthetic.
82. JAQUES, R. Alypin, a new anæsthetic. *Ophthalmoscope*, Nov., 1905.
83. SUKER, G. J. Scopolamine-morphine anæsthesia in ophthalmic practice. *Medicine*, Jan., 1906.
84. SANTOS, FERNANDES J. Stovaline in operation for entropion of the lower lid. *Rev. gén. d'opht.*, xxv., p. 99.

85. ADAM. Apparatus for determining the amplitude of accommodation. *Centralbl. f. prakt. Augenh.*, xxx., p. 16.
86. BORSCHKE, A. Simple method for determining stereoscopic vision. *Centralblatt. f. prakt. Augenheilk.*, xxx., p. 147.
87. OHM, T. Binocular pupillometer. *Centralbl. f. prakt. Augenh.*, xxx., p. 147, 129.
88. DILEY, C. W. Instrument for the determination of the centre of a lens. *Ophthalmoscope*, Dec., 1905.
89. ULRICHER, H. Improvement of Berger's binocular loupe. *Prager. med. Wochens.*, 1906, No. 21.
90. PERLMANN, H. A. A new holder for the illuminating lens. *Arch. f. Aug.*, lv., 3, 287.
91. ARMAIGNAC. An auto-synoptometer. *Acad. de Méd.*, 1906, Jan. 9.
92. WEISS, K. E. The metallophon, for the detection of metallic bodies (even if not iron) in the eye. *Centralbl. f. prakt. Aug.*, xxx., p. 100.
93. OPPENHEIMER. On lenses of novel construction. *Klin. Monatsbl. f. Augenh.*, xliv., 1, p. 250.
94. PUBLITZ. Pipette-bottle for eye-drops. *Arch. f. Aug.*, liv., 2, 182.
95. ALBRAND, W. Warmable eye-douche. *Centralbl. f. prakt. Augenh.*, xxx., p. 148.
96. STEPHENSON, S. Improved thermocautery for ophthalmic practice. *Ophthalmoscope*, Dec., 1905.
97. PETERS, A. Suction apparatus after Bier-Klapp in place of Heurteloup's artificial leech. *Ophth. Klinik.*, 1906, No. 4.
98. TODD, F. C. Some new foreign-body instruments. *Ophth. Rec.* May, 1906.
99. WÖRDEMAN, H. V. Transillumination of the eye in the differential diagnosis of intraocular tumors, with description of an ocular illuminator. *Ophth. Rec.*, May, 1906.
100. HULL, E. A. Movable artificial eye. *Northwestern Medicine*, Sept., 1906.
101. WILDER, W. H. Paraffin plates as an aid in operations for extensive symblepharon. *Jour. Amer. Med. Asso.*, Aug. 25, 1906.
102. DUANE, A. A tangent plane for accurately mapping scotomata and the field of fixation and single vision and for indicating the precise position of double images in paralysis. *Ophth. Rec.*, Oct., 1906.
103. BRUNS, H. D. The immersion treatment with argyrol solutions of the purulent ophthalmias. *Ophth. Rec.*, Dec., 1906.
104. STEVENSON, M. D. Instrument with which powder may be readily introduced into the anterior chamber of the eye. *Ophth. Rec.*, Oct., 1906.
105. STAUFFER, F. A successful operation for conical cornea. *Ophth. Rec.*, May, 1906.
106. BAKER, A. R. The use of the electric magnet and X-ray in removing foreign bodies from the eye. *Ophth. Rec.*, June, 1906.

HINSHIELWOOD (63, Argyrol in ophthalmic practice) calls attention to the fact that argyrol is free from irritating properties, even in 20-30% solution. Its action is decidedly soothing. Solutions should be freshly prepared or they irritate, without, however, becoming inactive. In conjunctivitis and affections of the lachrymal passages this drug is especially valuable.

SPENGLER (64, A danger of argyrol) finds argyrol the least irritating of all silver salts. It may be applied in 20-30% solutions. In syringing out the lachrymal passages in the presence of small tears and fissures in the tissues, argyrol may cause a slaty discoloration of the conjunctiva.

STEINKUEHLER (65, Protargol) advises the preparation of protargol solutions with cold water and immediately before using, as they are otherwise apt to cause irritation with pain and lachrymation.

MEYER (67, Further report on Crede's silver treatment) recommends collargol in 5% solutions for purulent conjunctivitis, blennorrhœa, and even trachoma.

SAGER (68, The action of formaldehyde on the cornea) dropped a 40% solution of formalin into an eye by accident. It was washed out as quickly as possible. For 3 or 4 hours there were no untoward symptoms, but then œdema of the lids set in and the eye was almost closed. There was marked chemosis. Six months later there was a smoky opacity of the cornea. Vision, about $\frac{1}{2}$. The eye was otherwise normal.

BINDER (69, Use of aristol in ophthalmology) recommends aristol oil in phlyctenular conjunctivitis and keratitis, blepharitis, erosions of the cornea, burns and injuries of the conjunctiva.

KRAUSE (70, Action of chrysarobin on the eye) saw three cases in which the use of chrysarobin for a skin affection was followed by conjunctivitis. There were corneal complications in two.

TERSON (71, Guaiacol in ophthalmic practice) finds that guaiacol is borne better than the fluid preparation from creosote. It may be used as an antiseptic, alterant, anaesthetic, analgetic, and antipyretic.

After the use of 3% solutions of hydrogen peroxide, NEUSTÄTTER (72, *Crustation by hydrogen peroxide*) observed the appearance of sharply defined intensely yellow white spots on the conjunctiva. They appeared one minute after the instillation and disappeared completely within an hour.

KOSTER (73, *Potassium chlorate in ophthalmic practice*) uses 3% solutions of chlorate of potash with good results in the treatment of catarrhal conjunctivitis, particularly the chronic type with corneal ulcerations.

SCRINI (74, *Local anaesthesia with alkaloids in oily solution*) recommends the use of alkaloids in an oily vehicle. The application is simple and agreeable. The action is more rapid, more intense, and lasting than that of aqueous solutions. Blepharospasm and lachrymation are never seen. The solutions keep well and are not easily decomposed. They are aseptic and remain so.

LIEBL (75, *Local anaesthesia with novocain-suprarenin*) finds that novocain may supplant cocaine, and works well in combination with adrenalin.

DEUTSCHMANN (77, *Use and abuse of atropin*) warns against the unnecessary and prolonged use of atropin. Permanent impairment of accommodation, glaucoma, and irritation of the conjunctiva are the principal dangers.

HINSHELWOOD (78, *Dionin in ophthalmic practice*) recommends dionin as an analgesic in cases of irritability and hyperaesthesia of the eye, as well as for the purpose of clearing up opacities.

GEBB (79, *Novococain and its anaesthetic action on the eye*) praises the anaesthetic action of novocain. It is completely soluble in an equal amount of water. A 5-10% solution dropped into the eye causes anaesthesia in 3-5 minutes, lasting an hour or more. There may be slight irritation and congestion of the ocular conjunctiva. The pupil may be slightly dilated, but accommodation is not affected. The toxicity is 5 or 6 times less than that of cocaine. The anaesthetic action is slightly less marked than that of cocaine.

STEPHENSON (81, *Note on alypin, a new anaesthetic*) discusses the anaesthetic action and good and bad points of cocaine and

alypin. The latter is to be preferred as it does not affect the pupil or accommodation, is half as toxic, and does not injure the corneal epithelium.

JAQUES (82, Alypin, a new anaesthetic) agrees with the last named author. The anaesthetic action of alypin is perfect. It produces slight dilatation of vessels.

SUKER (83, Scopolamin-morphin anaesthesia in ophthalmic practice) found that injections of scopolamin, gr. $\frac{1}{10}$, and morphin, gr. $\frac{1}{2}$, were followed by anaesthesia, muscular relaxation, and partial unconsciousness. Complete narcosis could then be induced with very small quantities of ether or chloroform. He advises its more general use in operations for glaucoma, cataract in restless patients, and enucleation.

The instrument devised by DILEY (88, Instrument for the determination of the centre of a lens) is intended to mark the optical centre of a lens. A stenopaic disk, a glass plate marked with a cross, and a wooden cross are combined so that they are accurately centred. If a lens be introduced this is disturbed, unless the centre of the lens is exactly opposite the intersection of the cross marks. The wood cross is movable so as to be used for the determination of the axis of cylindrical lenses.

ULBRICHER (89, Improvement of Berger's binocular loupe) has improved Berger's loupe by the addition of a lateral opening into the dark chamber, and by the attachment of changeable magnification.

PERLMANN (90, A new holder for the illuminating lens) has devised an instrument which allows the lens to be held in the mouth during local illumination and moved in any direction.

ARMAIGNAC'S (91, An auto-synoptometer) synoptometer is devised to test the presence of alleged monocular blindness. The visual acuteness of either eye can be determined without the patient knowing which eye is being tested.

OPPENHEIM (93, On lenses of novel construction) describes a bifocal lens, made by Strübin in Basle, for aphakial eyes, consisting of a lens cemented inside an ordinary convex lens.

ALBRAND'S (95, Warmable eye-douche) heatable eye-douche is a glass vessel like the ordinary nasal douche with a thermometer and a device for heating the solution for irrigation of the conjunctival sac.

STEPHENSON's (96, Improved thermocautery for ophthalmic practice) instrument is a modification of Beach's thermocautery. It is made small and handy for ophthalmic practice.

PETERS's (97, Suction apparatus after Bier-Klapp in place of Heurteloup's artificial leech) apparatus is a small cupping glass with a rubber bulb which is to be placed on the temple.

TOND (98, Some new foreign-body instruments) finds an instrument made V-shaped in section useful in removing bits of metal embedded in the cornea.

ALLING.

The illuminator described by WÜRDEMANN (99, Transillumination of the eye in the differential diagnosis of intraocular tumors, with description of an ocular illuminator) seems to be an improvement upon those in use because it is scarcely larger than a fountain pen and does not get hot. It somewhat resembles in construction the transilluminator employed for diagnosis of empyema of the frontal sinus.

ALLING.

HULL (100, Movable artificial eye) makes a circular incision with the scissors just posterior to the ciliary region and in front of the insertion of the recti muscles. He then removes the contents of the globe, pierces the sclera with a sharp-pointed scissors, and severs the nerve 20mm behind its juncture with the eyeball. The sclero-optic juncture is then excised leaving a zone of sclera to which the muscles are attached. It is nourished by a few twigs of the short posterior ciliary and long posterior ciliary arteries. A gauze drain is inserted for a few hours. A movable pad is thus formed upon which an artificial eye will rest.

ALLING.

WILDER (101, Paraffin plates as an aid in operations for extensive symblepharon) advocates paraffin plates for holding mucous or Thiersch grafts in place because they can do no harm to the cornea and can be built up to fit any conjunctival cul-de-sac. The graft adheres smoothly and evenly to the paraffin and no sutures are required. The sac may be cleansed by means of holes through the plates.

ALLING.

BRUNS (103, The immersion treatment with argyrol solutions of the purulent ophthalmias) instills argyrol in cases of purulent conjunctivitis every fifteen to thirty minutes con-

tinuously until the discharge ceases, using no other treatment. He claims that the disease is cut short and its severity lessened. Complicating corneal lesions are very uncommon and when occurring are less serious.

ALLING.

STEVENSON's (104, Instrument with which powder may be readily introduced into the anterior chamber of the eye) instrument consists of a tubular container into which the powder is introduced and from which it may be forced, after the instrument is in the anterior chamber by pressure on the piston rod in the handle. He prefers iodol powder.

ALLING.

STAUFFER (105, A successful operation for conical cornea) excised an elliptical piece of the cornea in an advanced case of keratoconus. He passed two sutures before making the incisions, the first of which was made with a Graefe knife and the operation was then completed with the scissors.

ALLING.

BAKER (106, The use of the electric magnet and X-ray in removing foreign bodies from the eye) uses both the large and small magnet but believes that a medium-sized magnet could be constructed to do all that can be done with the giant. He finds the sideroscope of no service, but uses X-ray in all cases. He has had no better result when the foreign bodies have penetrated the sclera, even though not involving the ciliary region, than when through the cornea, iris, and lens. The prognosis for saving the eyeball largely depends on whether the foreign body is infected or not. Of patients who come with foreign bodies in the posterior half of the eyeball 50% would be a fair estimate of those retaining some vision, and 25%, of those preserving a cosmetically good eyeball.

ALLING.

Sections IV.-VII. Reviewed by DR. ABELSDORFF, Berlin.

IV.—ANATOMY.

107. LEVINSONN, G. The posterior limiting layers of the iris.
v. Graefe's Arch. f. Ophth., Ixii., 3, p. 547.

108. FLEISCHER, R. The development of the lachrymal canaliculi in mammals. *Ibid.*, Ixii., p. 379.

109. KRUECKMANN, E. Embryology and development of support-

ing tissue in the optic nerve and retina. *Klin. Monatsb. f. Aug.*, xliv., 1, p. 162.

110. BLAAUW, E. E. The anatomy of the eye according to the ancients. *Ophthalmology*, Oct., 1905.

111. LOEB, C. Some cellular changes in the primary optic vesicle of *Necturus*. *Annals of Ophth.*, Jan., 1906.

LEVINSOHN (107, The posterior limiting layers of the iris) has examined irides of apes and man, and distinguishes a double layer of pigment-epithelium and a layer above it, composed of unstriped muscle fibres, on the posterior surface of this membrane. The so-called anterior layer of epithelium is not the site of the dilatator. The anterior pigment layer is purely epithelial. Bruch's membrane has a striate structure with rod-shaped nuclei quite different from the nuclei of the anterior epithelium. These nuclei, which are characteristic of unstriped muscle fibres, are sparse, and found mainly in the vicinity of the ciliary border of the sphincter.

FLEISCHER'S (108, The development of the lachrymal canaliculi in mammals) investigations show that in mammals both canaliculi develop from the upper end of the canal rudiment and grow into the upper and lower lid. The occasional development of accessory puncta is explained by division of the canaliculi in their growth toward the surface of the epithelium.

KRUECKMANN (109, Embryology and development of supporting tissue in the optic nerve and retina) lays stress on the generic relation of pigment epithelium to glia-cells, and illustrates this view by specimens of a rat embryo and of a chick 8 days old. So-called primary glia is still to be found in the fully developed eye in the form of Mueller's supporting cells. The principal feature of the second stage of development of the neuroglia is the development of astrocytes. In the nerve as well as in the retina, the protoplasm of the glia cells is reticular in structure.

LOEB (111, Some cellular changes in the primary optic vesicle of *Necturus*) has studied the development of the optic vesicles in *Necturus* and finds the lumen of the neural canal and later of the optic vesicles filled at first with a mass that seems to be of cellular nature. The cells are probably

derived from the walls, and later on disappear. The paper is well illustrated.

ALLING.

V.—PHYSIOLOGY.

112. GELZA REVECZ. Dependence of color threshold on achromatic stimulation. *Zeitsch. f. Sinnesphys.*, 41, 1, p. 45.
113. GUTTMANN, A. A case of green-blindness (deutanopia) with unusual complications. *Ibid.*, p. 45.
114. HEINRICH, W., and CHRISTEK, L. Periodic disappearance of small points. *Ibid.*, p. 59.
115. COLLIN and NAGEL, W. A. Acquired violet-blindness (tritanopia). *Ibid.*, p. 74.
116. GELZA REVECS. The diminution of stimulus of colored lights by white. *Ibid.*, 2, p. 102.
117. LEVY, MAX. A case of congenital bilateral blue-blindness (tritanopia). *Groefe's Arch.*, lxii., 4, 364.
118. BIRCH-HIRSCHFELD, A. Influence of light-adaptation on structure of nerve-cells of the retina in the dove. *Ibid.*, lxiii., p. 85.
119. GARTEN, S. Light-changes in the visual purple, *Ibid.*, lxiii., p. 112.
120. SCHIRMER, O. Note on my theory of lachrymal conduction. *Ibid.*, p. 200.
121. v. PFLUGK. Accommodation in the eye of the dove, ape, and man. *Habilit. Schr. Thieraerztl. Hochschule, Dresden*, 1906.
122. TIGERSTEDT, R. The limits of the visible spectrum. *Biophys. Centralbl.*, i., 1905.
123. COHEN, C. Influence of age on adaptation. *Klin. Monatsb.*, xliv., 1, p. 120.
124. BASLINI, C. A. A new entoptic phenomenon. *Arch. d'opht.*, xxii., p. 83.
125. PARSONS, H. J. The innervation of the pupil. *R. Lond. Ophth. Hosp. Rep.*, xvi., 1.
126. LEWIS, F. P. The ciliary processes in accommodation. *Am. Journ. of Oph.*, Nov., 1905.
127. EDRIDGE-GREEN, F. W. Relation of processes in color-blindness to the psycho-physical theory. *Ophthalmoscope*, Nov., 1905.
128. REICHERT, E. A new schematic eye. *Univ. Penn. Med. Bull.*, Dec., 1905.
129. DE HAAS, H. Electric currents in the retina. *Tydschr. voor Geneesk.*, 1906, 1, p. 8.
130. STEVENS, G. New phenomenon of color conversion. *Jour. Am. Med. Assn.*, July 21, 1906.

REVECZ (112, Dependence of color threshold on achromatic stimulation) studied the relation of the threshold value of a given stimulation by black and white to the intensity of the

stimulus, and found it to be a linear function of the given white stimulus. With increasing whiteness, the color had to be made more intense in order to be recognized. The highest chromatic value in this respect is attached to orange, then yellow, red, green, blue, and violet.

GUTTMANN [113, Case of green-blindness (deuteranopia) with unusual complications] reports the case of a mechanic, aged twenty-nine, with 5-6 D. of myopia, full vision, normal fundus, and congenital loss of sensation of red-green with weakened perception of blue and yellow. With the color top an equation could be made with yellow-gray and gray, and with blue-gray and gray, without any difference being detected between the decidedly yellow- and the blue-gray. There was marked diminution of perception of differences of illumination, which was most strikingly shown in the judgment of shades of the same color.

HEINRICH and CHRISTEK [114, Periodic disappearance of small points] examined the periodic disappearance of small points which has been attributed to variations in attention. It was found that there was an evident dependence of this disappearance on slight changes in the accommodative curvature of the lens, which it was possible to observe with the ophthalmometer and which were synchronous with the phenomenon cited. It can also be demonstrated entoptically by fixing a light source through two small openings. Dispersion circles are then seen which approach or separate with every change in the distance of the images of the light source from each other on the retina due to accommodative changes in lens refraction.

COLLIN and NAGEL [115, Acquired violet-blindness (tritanopia)] report the following cases: 1. A student suffering from peripheral rupture of the choroid, due to contusion of the globe, and serous imbibition of the macular region, showed in the injured eye a disturbance of color perception which was sharply limited to the fovea. Yellow was confounded with lilac; green of thallium and yellow-green, with blue. As the eye cleared, color perception was restored. 2. Neuro-retinitis albuminurica in a woman of twenty-four. Yellow appeared as blue, and equations were made of green with white and of

yellow with white. Color perception became normal as the eye got well. 3. Male, aged twenty-two, with bilateral partial optic nerve atrophy. Green-yellow was not recognized. Blue and green, and green and yellow were not distinguished. Violet of a shorter wave length than 430mm appeared colorless.

REVECZ (116, The diminution of stimulus of colored lights by white) investigated the reciprocal relations between achromatic and chromatic stimulation of the eye. It was found that simultaneous perception of white weakens color stimuli, especially blue, then green, red, and yellow.

LEVY [117, A case of congenital bilateral blue-blindness (tritanopia)] reports the case of a man of thirty, healthy, with normal vision and fundus, who had "had trouble" with color perception since childhood. Examination with Stilling's pseudo-isochromatic tables and Nagel's color-equation apparatus and tables failed to detect any marked abnormality. Holmgren's test wool showed violet blindness. Tests with the spectrum showed a decided shortening at the short-wave end. The neutral point lay in the yellow of the spectrum.

BIRCH-HIRSCHFELD (118, Influence of light-adaptation on structure of nerve-cells of the retina in the dove) found a diminution of chromatin in the ganglion cells of the retina of the dove after sudden light adaptation. Intense artificial light is much more active in destroying chromatin than diffuse daylight. An accumulation of basiophilic coloring matter was found in the inner member of the cones, in the form of an intensely colored horizontal stripe.

GARTEN (119, Light-changes in the visual purple) investigated the question of the visual yellow of Kuehne, and the possible variations in bleaching of visual purple by light of short and long wave-length, respectively. It was found that a retina exposed to unvarying violet light appears darker if previously bleached with yellow; that there was an increase of absorption of extreme violet rays and a diminution of that of red rays, after previous bleaching, and that the formation of visual yellow could be observed in the living eye of the

bleak-fish and frog, after exposure to sunlight. Fresh retinæ show a bright yellow only when the bleaching has been rapid.

SCHIRMER (120, Note on my theory of lachrymal conduction) has devised a model to demonstrate that the mucous membrane covering the nasal orifice of the naso-lachrymal duct acts as a valve, closing off the capillary opening to the nares in case of aspiration from the tear points, while no obstacle is presented to an outflow through the nasal passages.

v. PPLUGK (121, Accommodation in the eye of the dove, ape, and man) froze and sectioned the eyeballs of doves and apes to fix the conditions of lens curvature during accommodation and rest. Strophantin and eserin were used for the first type; curare and atropin, for the second. The major part of accommodation involves the posterior surface of the lens in the form of a lenticonus posterior. The position of rest is approximately spherical, but in accommodation there is an increasing inward bending of the posterior surface. In the dove there is a combination of corneal and lenticular accommodation. The ligamentum pectinatum is composed of elastic fibres. The dilatator pupillæ is probably represented by a flat layer of deeply pigmented cells on the posterior surface of the iris, corresponding to Bruch's membrane in mammals.

COHEN (123, Influence of age on adaptation) examined 30 healthy individuals with normal eyes to determine the conditions of adaptation in the various decades of life. In the first decennium, there is an unfavorable "adaptation power"—that is, threshold height of necessary stimulus, which improves in the third and fourth decade, and then gradually deteriorates. Rapidity of adaptation, which is low in childhood, becomes markedly diminished in old age. (These results are directly opposed to those of Woelflin, in *Graefe's Archiv.*)

PARSONS (125, The innervation of the pupil) discusses the innervation of the pupil. The existence of dilatator fibres is taken for proven by physiological experiments, and their innervation by the sympathetic granted. Contraction may depend on tonic action of the constrictor muscle or relaxation of the dilatator, or dilatation of the blood-vessels. Mydriasis is brought about by a reversal of either of these three factors.

Paradox pupillary contraction, which may take place after tonic impulses have been excluded by section of the constrictor paths at any point, may be explained, according to Anderson, by increased irritability of the nerveless sphincter, which probably depends on changes in vascularity and blood supply. There are no dilating fibres in the trunk of the oculomotor nerve. They are found in the cervical sympathetic only. The centre for the pupillary reflex is probably in the nucleus of the third nerve. Paradox pupillary dilatation may occur, as in cats, after removal of the superior cervical ganglion, and instillation of eserin or exposure to light. The induction of slight dyspnoea will then cause almost complete mydriasis on the operated side (this could be explained on the basis of Meltzer-Auer's observations of inhibitory fibres running to the dilatator from the ganglion. P. H. F.). Contraction consensual with accommodation is a constrictor phenomenon which is really synergistic with convergence. The sensorial reflex is a dilatator phase which may be excited by pain, contact, and other stimuli.

LEWIS (126, *The ciliary processes in accommodation*) considers the ciliary processes to be made up of erectile tissue. Accommodation is virtually a vascular phenomenon. The size of the processes is regulated by the degree of contraction of the circular fibres of the ciliary muscle, and on this the convexity of the lens depends directly.

EDRIDGE-GREEN (127, *Relation of processes in color-blindness to the psycho-physical theory*) details his well-known theory of color preception, and again shows that the phenomena can only be explained by the assumption that each fibre of the optic nerve conducts waves of stimulus corresponding to all wave-lengths.

REICHERT (128, *A new schematic eye*) has constructed a modification of Kuehne's schematic eye, consisting of a projection apparatus with light source, a lens holder, and a sight space. The last is a vessel containing a weak solution of creolin to allow the rays to be followed by the observer. Demonstrations can be made before students, showing the effect of astigmatism, accommodation, refraction changes, and so on.

DE HAAS (129, Electric currents in the retina) has studied the electric currents which can be demonstrated with a galvanometer when one electrode is placed on the cornea and another on the sclera. In the dark there is a rest-current, and when the eye is exposed to light, an action-current. Both originate in the layer of rods and cones, and the photo-electric reaction proves that, as was believed, the cones are active in perception of colors and of bright light, and the rods for weak light. If Hering's theory were correct, assimilation and dissimilation should be followed by currents of opposite course, but this is not the case, as all spectral colors produce currents of similar polarity.

STEVENS (130, New phenomenon of color conversion) describes an interesting experiment in color sensation. If a narrow stripe of color be placed in a large field of the complementary color and viewed with a fixed gaze, the colored stripe will disappear, and the whole space becomes of one color. He suggests that the difference in wave-lengths requires a different refraction, and this may have some bearing on the phenomenon. Red stripes on a green field seem to be most favorable for the experiment.

ALLING.

VI.—REFRACTION AND ACCOMMODATION.

131. POLATTI. Cavernous (lacunar) optic atrophy and dehiscence of the sclera in high myopia. *Klin. Monatsbl. f. Aug.*, xliv., 1, p. 14.
132. STILLING, J. The myopia of public-school-mistresses. *Ibid.*, p. 41.
133. FLEISCHER. Tears of Descemet's membrane in myopia. *Ibid.*, p. 64.
134. FUSS. The question of elastic tissue in normal and myopic eyes. *Virchow's Arch.*, 183, p. 485.
135. GELPK. Operation for high myopia. *Med. Klinik*, 2, p. 39.
136. STILLING, J. The fundaments of my theory of myopia. *Zeitsch. f. Aug.*, xv., 1, 1.
137. PANSE, G. Lasting results of operation of high myopia. *Ibid.*, p. 115.
138. BOURDEAUX, B. Cure of myopic convergent squint by a modified dipioscope. *Soc. d'opht. de Paris*, Dec. 5, 1905.
139. BLACK, N. M. Advantages and disadvantages of glasses in railway service. *Am. Journ. of Ophth.*, Feb., 1906.
140. WEEKS, J. E. Report of a case of diabetic myopia. *Am. Journ. of Ophth.*, May, 1906.

141. JACKSON, ED. The mechanism of accommodation and astigmatic accommodation. *Am. Journ. of Ophth.*, May, 1906.

POLATTI [131, Cavernous (lacunar) optic atrophy and dehiscence of the sclera in high myopia] examined sections of the eye of a woman of sixty-eight, affected with myopia of over 30 D., and with marked atrophic patches about the macula. In one eye, there were an incomplete perforation of the sclera, 2mm from the disk, to the temporal side, containing degenerated retinal tissue; a second complete perforation in the intervaginal space of the optic nerve, with similar contents; and a third in the lamina cribrosa. It is a question whether these dehiscences were congenital or due to myopia. Both nerves were markedly atrophic, and back of the lamina cribrosa there was an increasing loss of supporting connective-tissue network, besides the atrophy of nervous elements, so that actual cavities appeared, whose walls were formed of connective-tissue fibres. There was some proliferation of neuroglia. This myopic atrophy was a product of degeneration of the retina which was entirely destroyed in the area of the conus, and of consecutive ascending degeneration of the nerve.

STILLING (132, The myopia of public-school-mistresses) found only about 17% of myopia, including monocular error, in female school-teachers in Strassburg. There was only one case of excessive myopia with fundus changes. Handiwork is not engaged in to excess. Seggel's observation of diminished light-sense in myopia was not confirmed.

FLEISCHER (133, Tears of Descemet's membrane in myopia) reports the case of a boy of ten with myopia, R 20 D., L 25 D., and a girl of twenty-one with R M. 15 D., M. Asm., 5 D; L M. 9 D. In both cases there were transparent, double-bordered striations on the posterior surface of the cornea which looked like threads of spun glass. The parenchyma was cloudy. These changes were doubtless the expression of tears of Descemet's membrane as we see them in hydrophthalmus, which show that there was a deformation, by traction of the anterior segment of the globe, corresponding to the myopic traction-changes at the posterior pole, which are so well known, and which were marked in both cases.

FUSS (134, The question of elastic tissue in normal and myopic eyes) was unable to confirm Lange's finding of a lack of elastic fibres in the myopic eye. There is marked individual variation in the number and thickness of the elastic fibres of the sclera, and an increase takes place only in the first 20-30 years. Senile eyes can no longer be distinguished from those of middle age by the amount of elastic fibres. Three highly myopic eyes showed the same amount of elastic fibres (Weigert resorcin-fuchsin stain) as normal globes.

GELPK (135, Operation for high myopia) answers some objections which have been raised against the operation for high myopia. In 146 cases he had only 2 detachments. If the technique is perfect, and careless "late discussion" is avoided, the operation is a relative prophylaxis against complications.

STILLING (136, The fundaments of my theory of myopia) lays stress on the factor of growth under muscle pressure in the development of myopia. During near work, all the muscles of the eye are actively or passively stretched. The obliques are the decisive factor simply because their action is variable, while that of the other muscles is qualitatively constant. If the loop of the obliqui is open, the eye will retain its spherical form in case the tonus of recti and obliqui is equal. If the loop be closed, lateral growth will predominate if the tendon of the superior oblique runs in a median position, while antero-posterior development will predominate if the tendon runs transversely, unless this be compensated for by an increased tonus of the recti.

PANSE (137, Lasting results of operation of high myopia) studied cases operated on by Pflueger according to Fukala's method. Twenty-four eyes were kept under observation for from 6 to 11 years, 14 for at least 10 years; the average vision was 0.3 before and 0.72 many years after operation. Panse believes that there is an improvement of retinal function in many cases, and that the operation, especially in already developed choroiditis, has a marked prophylactic action. The earlier the operation is performed, the better the results. In only 3 eyes was there a lack of change in refraction. In the other 19, which were hypermetropic

after operation, this had decreased or changed to myopia, even in patients over 40. The operation checks but does not stop the expansion at the posterior pole. There was no single case of loss of an eye or of detachment. Of 3 eyes with central choroiditis, 2 got good vision, while 2 others not operated on lost central vision.

BLACK (139, Advantages and disadvantages of glasses in railway service) after practical experience in riding six thousand miles in the cabs of engines believes that an employee (engineer or fireman) who has been continuously at work for five years is a safe man although an examination shows that it is necessary to wear glasses to obtain the standard vision. He is upheld in this opinion by the practically unanimous agreement of the ophthalmologists of the United States to whom he sent a list of questions bearing on this subject.

ALLING.

Changes in refraction due to diabetes are rare. WEEKS (140, Report of a case of diabetic myopia) describes the case of a man fifty-two years old whose refraction he found to be R, +0.125 D.; L, +0.25 D. \times -0.5 D., cy ax 10°, with vision $\frac{1}{2}$. This was the same after three years but then the vision began to be blurred for distance. Coincident with this increasing defect in vision there developed polyuria and in a little over one month after the former examination, the refraction was R, -0.62 D. \times -0.5 D., cy 90°; L, -0.5 D. \times -0.75 D. cy 40°; both, $\frac{1}{2}$. Still a month later after rigid diet the refraction again became hypermetropic. The change in the refraction has been thought to be due to increase in the refractive index of the lens as a result of presence of sugar in the fluids of the eye.

ALLING.

JACKSON (141, The mechanism of accommodation and astigmatic accommodation) agrees with the generally accepted opinion that the crystalline lens is composed of curved elastic fibres and that accommodation is brought about by thickening of the lens through the release of the tension on the zonula. He has studied with the skiascope the refraction of the centre and of the edges of the lens when the eye was focused for distance as well as for near. The increase in refraction in accommodation was greater at the centre than at the

periphery but such differences varied greatly in individuals. He does not believe it impossible that the ciliary muscle contracts irregularly and thereby produces changes in astigmatism but rather explains this phenomenon on the supposition that there may exist asymmetry in the elasticity or arrangement of the lens fibres.

ALLING.

VII.—MUSCLES AND NERVES.

142. HOWE, LUCIEN. Field of fixation and methods of measuring it. *Annals of Ophth.*, April, 1906.
143. FROELICH, C. On unilateral atropinization in concomitant convergent squint. *Klin. Monatsbl. f. Aug.*, xliv., 1, p. 1.
144. LOESER. Paralysis of eye-muscles after lumbar anaesthesia. *Med. Klinik*, 1906, No. 10.
145. CASPAR, L. Observations on unilateral reflex pupillary paralysis. *Arch. f. Aug.*, liv., 1, p. 53.
146. WINGENROTII, E. Aducens paralysis due to disturbances of menstruation. *Ibid.*, p. 68.
147. MILLER. Vertical squint. *Muench. med. Wochensch.*, 1906, 3, p. 7.
148. DREYFUSS, G. Traumatic pupillary paralysis. *Ibid.*, p. 355.
149. KREUZFUCHS, S. Traumatic pupillary paralysis (answer to the above). *Ibid.*, p. 466.
150. ADAM, C. Case of abducens paralysis following spinal anaesthesia. *Ibid.*, p. 360.
151. KEMPNER. Disturbances in the ocular branches of the trigeminal, particularly the corneal reflex. Diagnostic significance. *Berl. Klin. Wochensch.* 1906, p. 378.
152. SAHLI. Cortical localization of conjugate deviation of eyes and head. *D. Arch. f. Klin. Med.*, 1886, p. 1.
153. BACH. The motor nuclear regions after lesion of peripheral nerves. *Centralbl. f. Nervenheil. u. Psych.*, xxix., p. 140.
154. HUGUENIN. Dizziness in ocular paralysis. *Correspondenzbl. f. Schweiz. Aerzte*, 1906, 1, 1.
155. BIELSCHOWSKY, A., and LUDWIG, A. Significance of latent muscular imbalance and of vertical deviation. *v. Graefe's Arch.*, lxii., 3, p. 400.
156. REMY. Two facts in the explanation of strabismus. *Rec. d'Oph.*, xxviii., 179.
157. ZENTMAYER, W. Paralysis of upward movements of the eye. *Oph'logy*, Oct., 1905.
158. BALLANTINE, A. Two cases of lid closure reflex of the pupil. *Ibid.*, Feb., 1906.
159. BLAGOWESTCHENSKY. The visual field in concomitant squint. *Westn. Ophth.*, 1905, No. 6.

160. BLOK. Occupational nystagmus. *Tydshr. voor Geneesk.*, I, No. 8.
161. GARIPNY, E. Isolated paralysis of the superior oblique due to orbital traumatism. *Rec. d'Oph.*, xxvii., p. 705.
162. ABADIE and DUPUY-DUTEMPS. Facial hemi-spasm cured by a deep injection. *Arch. d'Oph.*, xxvi., p. 70.
163. HOWE, L. Note on the measurement of torsion. *Amer. Jour. of Ophthal.*, May, 1906.
164. VALK, F. Dextrophoria. *Amer. Jour. of Ophthal.*, April, 1906.
165. COLBURN, J. E. Fixation of the external rectus muscle in nystagmus and paralysis. *Amer. Jour. of Ophthal.*, March, 1906.
166. CLAIBORNE, J. H. Conjugate deviation. *Jour. Amer. Med. Asso.*, Aug. 18, 1906.
167. REBER, W. A study of convergence and its defects, including an analysis of four hundred and forty-one cases of exophoria. *Jour. Amer. Med. Asso.*, Sept. 1, 1906.
168. DUANE, A. Unilateral rotary nystagmus. *Oph. Record*, Oct., 1906; also *Trans. Amer. Oph. Soc.*, 1906.

HOWE (142, Field of fixation and methods of measuring it) notes the prevalent disregard of torsion which takes place in the act of convergence and suggests its clinical importance. He gives a brief description of an instrument which he has devised for the measurement of torsion and promises a more detailed discussion of the whole question later. ALLING.

FROELICH (143, On unilateral atropinization in concomitant convergent squint) treated nine cases of convergent squint by atropinizing the fixing eye according to Worth. In five there was no result; in four the deviation was corrected. Of these, three were also treated with convex lenses. In the fourth case, only fingers could be counted, and after correction of the deviation there was no improvement in vision. Of the unsuccessful cases one had faulty projection; in another, a squint of the right eye became alternant, and the vision of the atropinized eye improved from $\frac{1}{10}$ to $\frac{1}{8}$. The originally fixing eye then became affected with squint, and vision fell from $\frac{1}{8}$ to $\frac{1}{10}$. Finally a right-sided squint again appeared, the vision of the squinting eye fell to $\frac{1}{8}$, and the originally fixing eye had vision $\frac{1}{8}$.

LOESER (144, Paralysis of eye-muscles after lumbar anaesthesia) observed left trochlearis paralysis after spinal anaes-

thesia with novacain, and left abducens paralysis after stovain anaesthesia. The disturbances appeared a few days after the operation and disappeared in a week or two. As all other factors were absent, a toxic effect is surmised, and ascribed to the intradural injection of the drug. It was impossible to determine whether the nerves or the nuclei were injured.

CASPAR (145, *Observations on unilateral reflex pupillary paralysis*) reports seven cases of unilateral reflex pupillary paralysis. In one case there was tabes, and in two a suspicion of tabes or paresis. In two, injury of the head near the affected eye and paralysis of ocular muscles had preceded. In three cases the lamed pupil was larger, and in three others, smaller, than its fellow. Reaction to convergence was not impaired. Caspar follows the explanation of Heddaeus, attributing a double origin to the iris branch of the oculomotor nerve, one root for light reaction arising in the sphincter nucleus and another for accommodative consensual reaction.

WINGENROTH (146, *Abducens paralysis due to disturbances of menstruation*) reports the case of a woman of thirty-one, who had an unusually sparse menstrual flow after an exhausting mountain climb. Immediately after, right abducens paralysis supervened. Eyes and nerves were otherwise normal. After establishment of the normal flow, the paralysis disappeared completely and finally. The disturbance could be explained by a small cerebral hemorrhage from over-exertion with accompanying menstrual disorder, to cerebral hyperæmia due to suppression of the menses with or without brain hemorrhage, or to the effect of toxins which were not eliminated on account of suppression of the menses.

MILLER (147, *Vertical squint*) believes, with Schoen, that vertical strabismus may have a deleterious effect on the vagus, and that the nervous disorder can be relieved by prisms. Of 10 cases so treated, 2 were cured of their "vagus" symptoms involving the heart, stomach, etc., by prismatic correction of the vertical deviation.

DREYFUSS (148, *Traumatic pupillary paralysis*) reports a case of meiosis and pupillary rigidity coming on seven days after crushing injury of the cervical vertebræ. There was

also flaccid paralysis of the upper, and spastic paralysis of the lower extremities, dyspnoea and æsthesia, and other symptoms due to the spinal lesion. Dreyfuss believes that reflex pupillary rigidity may also be caused by degeneration of fibres which transmit psychical impulses.

KREUZFUCHS (149, Traumatic pupillary paralysis: answer to the above) calls attention to the darkening reflex of the pupil, by way of the trigeminus dilatation centre in the cervical cord and sympathetic, which he has demonstrated in rabbits. The case reported above by Dreyfuss is further proof that elimination of the dilatation centre induces meiosis.

ADAM (150, Case of abducens paralysis following spinal anaesthesia) reports a case of left abducens paralysis developing three weeks after spinal anaesthesia with stovaine for herniotomy.

KEMPNER (151, Disturbances in the ocular branches of the trigeminal, particularly the corneal reflex) found, in a series of 150 examinations, 55 patients with organic and 27 with functional disease who showed disturbances of the ocular distribution of the trigeminal nerve. Unilateral loss or diminution of the corneal reflex was found in 32 cases, and was generally functional (of psychical origin). Organic reflex disturbance, seen in 31 cases, was generally organic unilateral, and complicated with sensory disturbances which are generally progressive. The corneal reflex could be elicited in newborn children. Soelder's corneo-mandibular reflex, consisting in a displacement of the jaw to the opposite side when the cornea is irritated, was found 11 times in 600 patients. No diagnostic significance could be determined.

SAHLI (152, Cortical localization of conjugate deviation of eyes and head) observed a stationary deviation of the eyes and head to the left which lasted at least three or four days, could be temporarily suppressed by an effort of the will, and was uncomplicated by other paralytic or spastic symptoms. On autopsy (œsophageal carcinoma) an abscess was discovered in the left frontal lobe. The conjugate deviation was a symptom of this destructive lesion. The common cortical centre for conjugate motions of the eyes and rotation of the head to the opposite side is located at the foot of the middle

cerebral gyrus. The angular gyrus, temporo-sphenoidal lobe, and underlying white substance are merely an area which transmits sensory stimuli which have a centripetal action on the position of the head and eyes.

BACH (153, The motor nuclear regions after lesion of peripheral nerves) avulsed a large portion of the oculomotor nerve together with the globe and the external ocular muscles. After six months most of the cells of the nuclei corresponding to the muscles had degenerated. There was, however, no degeneration of cells in the nuclei of Edinger-Westphal. These nuclei have not been proven to be the centres for the sphincter as they have been found normal in a number of cases of sphincter paralysis, and conversely, Siemerling has noted degeneration of these nuclei in a case where there was no paralysis of the sphincter.

HUGUENIN (154, Dizziness in ocular paralysis) claims that paralysis of the abducens and internus cause no vertigo as long as the gaze remains in the horizontal plane. Tilting of the retinal pictures is the factor causing a feeling of insecurity, as in travelling in cars. It is this factor which causes dizziness in paralysis of the oblique muscles.

BIELSKOWSKY and LUDWIG (155, Significance of latent muscular imbalance and of vertical deviation) lay stress on the distinction between actual imbalance depending on mechanical factors, and latent heterophoria due to nervous influence. The latter, as in the form of fusion stimulus, cannot always be excluded. Their statistics show that neuropathic individuals are not more subject to heterophoria than healthy ones. The highest degrees, up to 15° of latent vertical divergence, were found in persons who did not have any untoward symptoms. In hyperphoria, the deviation is most marked in adduction of the squinting eye. Latent rotation of meridians (cyclophoria) is rarely found as an uncomplicated symptom, as other evidences of muscular imbalance are presented in cases of paralysis or insufficiency of the oblique muscles.

ZENTMAYER (157, Paralysis of upward movements of the eye) reports a case of ocular motor paralysis with sudden onset. Convergence was weakened and there was loss of

upward motion of both eyes separately or conjugate. The lesion was probably situated near the aqueduct of Sylvius, involving the oculomotor nuclei.

ALLING.

BALLANTINE (158, Two cases of lid closure reflex of the pupil) examined a girl, aged seventeen, suffering with chorea and rheumatism. At the first examination there was still some photophobia with marked blepharospasm. It was noted that the pupils became smaller when the lids were opened. The same change took place while the lids were held open and the patient tried to close them. This pupillary contraction could be elicited only when the lid closure was of very short duration, and after energetic closure lasting for some time the pupils remained contracted until the exertion had passed over. This condition persisted after the patient had recovered, and was probably congenital, like the lid-closure movements. The second patient was a nervous woman with attacks of functional spasm. She was highly myopic. The occurrence of this reflex in hysteria has been described previously, notably by Westphal.

MARSHALL.

BLAGOWESTCHENSKY (159, The visual field in concomitant squint) tested the monocular field of vision of 36 eyes with convergent squint of which 17 were amblyopic, and 21 divergent squints, of which 9 were amblyopic. He concludes that the limitation of the field in both forms is to be ascribed to the underlying amblyopia and not directly to the strabismus. In the few cases in which there was limitation without visual defect, the disturbance was so slight as to be explicable by errors of examination.

BLOK (160, Occupational nystagmus) observed horizontal nystagmus with rapid excursions in a man of twenty who was anaemic, weak, and nervous. There was no disease of the eye. The symptoms disappeared after a few days' rest and were probably to be explained as an occupational disturbance like miner's nystagmus.

ABADIE and DUPUY-DUTEMPS (162, Facial hemispasm cured by a deep injection) used alcohol injections into the stylo-mastoid foramen in the case of a seamstress aged fifty-six, with hemi-facial spasm and blepharospasm of 16 years' duration. The eye could not be opened on account of the

facial spasm. The other eye had been injured and had only V $\frac{1}{20}$. A complete cure resulted. The injection can be made absolutely painless by the addition of cocaine or stovain.

HOWE (163, Note on the measurement of torsion) in this paper presents a chapter from his forthcoming book on the muscles of the eye. He discusses methods of measurement of the field of fixation by means of perimeter and tropometer, and points out the value of a knowledge as to (1) whether a deviation of one or both eyes exists, (2) which eye is affected, (3) exactly which muscle or group of muscles is at fault, and (4) whether deviation is due to spasm or paralysis. ALLING.

VALK (164, Dextrophoria) using the tropometer of Stevens to measure the field of fixation finds occasionally a weak external rectus in one eye, associated with an insufficient internal rectus of the other, *i. e.*, a tendency for both eyes to rotate either right or left, and believes such errors capable of causing eye-strain. He calls this condition dextrophoria and laevophoria.

ALLING.

COLBURN (165, Fixation of the external rectus muscle in nystagmus and paralysis) has formerly described an operation for nystagmus which consists in fixing the external rectus muscle to the periosteum of the temporal wall of the orbit. He passes a doubly armed suture through the muscle and then through the periosteum and out through the skin, tying it over a plate. He now also recommends the procedure in selected cases of paralysis, fixing the externus and advancing the internus.

ALLING.

CLAIBORNE (166, Conjugate deviation) points out the fact that conjugate deviation is of uncertain value in localization in apoplexy, because it is of transitory character since the other side of the brain probably takes up the function of the stricken side, and because the position for the cortical centre for associate movements is not yet established. He relates a case which he believes to be one of irritative lesion in a pia meningitis following middle-ear suppuration. The deviation of the eyes to the left was explained by finding a lesion at the autopsy in the region of the right inferior parietal lobe, which supports the views of many authorities as to the location of the centre for conjugate movements. Another case was

evidently one of a destructive lesion which improved under potassium iodide. He offers the following scheme for diagnosis.

Irritative lesions	{ Cortical: Eyes look away from lesion. Nuclear: Eyes look toward lesion.
Destructive lesions	{ Cortical: Eyes look toward lesion. Nuclear: Eyes look away from lesion.

ALLING.

REBER (167, A study of convergence and its defects, including an analysis of four hundred and forty-one cases of exophoria) believes exophoria to be a reversion to a lower type, since only in man and the anthropoid apes do we find the optic axes parallel. In his study of convergence he has found the average amount to be between ten and eleven metre angles, confirming Landolt. He finds the cover test the most reliable at a distance, but uses Maddox rod with small electric light for the near point, in preference to the vertical diplopia test. The treatment of exophoria should comprise: (a) Right living, (b) careful refraction, (c) convergence training, (d) prisms base in for infinity, (e) prisms base in for reading only, (f) tenotomy or advancement. ALLING.

According to DUANE (168, Unilateral rotary nystagmus) only fifty or sixty cases of unilateral nystagmus have been reported. Of these five have been purely rotary. In the case described the usual accompanying defects were conspicuous by their absence, namely, anisometropia, ametropia, unilateral amblyopia, squint or other ocular deviations or evidence of nerve or ear disease. The patient was conscious of diplopia with rhythmical oscillations of one image, and could herself see the nystagmus with the other stationary eye.

ALLING.

Sections VIII.—XII. Reviewed by DR. R. SCHWEIGGER,
Berlin.

VIII.—LIDS.

169. MACNAB, A. Marginal blepharitis. Causes, pathology, and treatment. *R. Lond. Ophth. Hosp. Rep.*, xvi., 3.

170. VOGT, A. Premature grayness of the lashes, etc. *Klin. Monatsbl. f. Aug.*, xliv., Q. 1, p. 228.

171. STEPHENSON, S. Unusual coincidence of interstitial keratitis and turning gray of the lashes. *Oph'tscope*, Feb., 1906.
172. APETZ, W. Symmetrical gangrene of both lids after injury to the brow. *Muench. med. Wochensch.*, 1906, 19, p. 980.
173. VALUDE and DUCLOS. Malignant lentigo of the lids. *Soc. d'Oph. de Paris*, 6 February, 1905.
174. BRYANT. Pigmentation of the lids in exophthalmic goitre. *Clinical Journ.*, 26, April 1905.
175. FREYTAG, G. Paradoxical lid-movements. *Deutschmann's Beitraege*, No. 65, p. 275.
176. MUNTENDAM. Associated movement of the upper lid. *Ned. Tydsch. voor Geneesk.*, 1906, vol. i., No. 8.
177. SNYDACKER, E. Plastic lid-operation with flap from the neck. *Arch. of Ophth.*, XXXV., 1.
178. THOMPSON, J. J. Surgical treatment of ptosis. *Ann. of Oph.*, Oct., 1905.
179. KUHNT, H. Operative enlargement of the lid-fissure with use of cutaneous tissue. *Zeitsch. f. Aug.*, XV., 13, p. 238.
180. MONTHUS, A. Beneficial effect of tarsorrhaphy in injuries of the globe. *Arch. d'Oph.*, xxvi., p. 13.
181. BACH, L. Symmetrical lipomatosis of the upper lids (Blepharochalazis?). *Arch. f. Aug.*, liv., 1, p. 73.
182. HIRSCHBERG, J. Congenital lymphangioma of lids, orbit, and face. *Centralbl. f. prakt. Aug.*, XXX., p. 2.
183. HOSCH. Ophthalmological miscellany. 6.—Lipo-dermoid of the conjunctiva. *Arch. f. Aug.*, liv., 2, p. 159.
184. OUISE. Bilateral coloboma of the upper lids with dermoid of the sclero-corneal margin. *Arch. f. Aug.*, liv., 3, 227.
185. ROSENMEYER, L. Cirsoid neuroma and hydrocephalus. *Centralbl. f. prakt. Aug.*, XXX., 3, p. 70.
186. WUERDEMANN, H. V. Primary metastatic sarcoma of lower lid and orbit. No recurrence for years after removal and extirpation of orbit. *Ophthalmology*, Oct., 1905.
187. JOHNSTON, H. Primary sarcoma of the eyelids. *Ibid.*
188. PRAWOSSUD, N. Two cases of cancer treated with radium. *Westin. Oph.*, 1905, No. 6.
189. TROUSSEAU, A. Epitheliomas of the lids. Radium or operation? *Ann. d'Ocul.*, cxxxv., p. 60.
190. ROLLET. Treatment of palpebral epithelioma. Blepharoplasty with sliding flap. *Rev. gener. d'Oph.*, XXV., p. 49.
191. FAURE-LACAUSSADE. Epithelioma of the lids. *Soc. d'Oph. de Paris*, 6 February, 1906.
192. BAKER, C. Two cases of plastic lid formation. *Oph. Rec.*, April, 1906.
193. RISLEY, S. D. Cavernous angioma of the eyelid. *Oph. Rec.*, March, 1906.

MACNAB (169, Marginal blepharitis; causes, pathology, and

treatment) intends to show that marginal blepharitis is due to the same micro-organism as angular conjunctivitis, viz., the bacillus of Morax-Axenfeld. The germ is constantly present and clinically it is possible to demonstrate transitional forms of these affections. Zinc sulphate is beneficial in both diseases.

MARSHALL.

VOGT (170, Premature grayness of the lashes, etc.) reports a case of severe bilateral iridocyclitis in a man of eighteen, in whom several lashes at the middle of the upper lid turned white. Some were white only at the tip. There were some white hairs in the brows and there was partial baldness. Two months before, there had been no evidence of these changes. They progressed for three weeks and then remained stationary. Circulatory and nervous changes due to the iridocyclitis were the causal factors. Similar occurrence has been noted in cyclitis, sympathetic inflammation, and hemicrania. Spontaneous sudden grayness has been noted in quite young persons. Gray lashes cause dazzling. Irritant salves may stimulate the production of pigment.

STEPHENSON (171, Unusual coincidence of interstitial keratitis and turning gray of the lashes) reports the case of an unmarried woman of thirty-nine. The left eye had been slightly injured in December, 1899. It became inflamed, and was examined six weeks later. There were typical signs of congenital syphilis and well marked kerato-iritis. In August, 1901, the inner half of the lashes of the right eye became white. The hair was quite black. In March, 1905, the inner half of the upper lid showed several gray lashes interspersed with some black ones. There were signs of a persistent interstitial keratitis. Cases of uveitis with turning gray of the lashes are reported.

MARSHALL.

APETZ (172, Symmetrical gangrene of both lids after injury to the brow) examined a child of eighteen months, which had fallen in the street receiving a skin wound 3mm long over the frontal tuberosity which was superficial and healed promptly with a smooth scar. Three days later the skin of the forehead and lids began to swell, became discolored, and sloughed off. Fever was present. In the neighborhood of the glabella

a sharply defined swelling developed. On incision flaky pus with necrotic tissue was evacuated, containing streptococci. A second small abscess above the right lachrymal sac was opened. The skin of the upper lids as far as the orbicularis muscle became necrotic and this gangrenous process wandered past the external canthus to the lower lids. Under moist antiseptic dressings the wounds became clean and cicatrized smoothly. The lid-margins and cilia were unaffected. The spreading of the gangrenous area from a single focus on the brow to both upper and lower lids is explained by the distribution of the superficial lymphatics.

FREYTAG's (175, *Paradoxical lid-movements*) patient, a girl of twenty-seven, showed complete right oculomotor paralysis with paresis of the external rectus. This came on six months after an apoplectic attack with paralysis of the left side of the head and trunk which had improved. On associated motion of the eyes to the right, the right upper lid was raised completely and energetically. Where these symptoms have been acquired there are generally other disturbances of motility present, and paralyses are frequent.

MUNTEDAM (176, *Associated movement of the upper lid*) saw a woman of forty-seven with congenital ptosis. The paralyzed levator palpebrae of the right eye was able to raise the lid perfectly whenever the patient moved the lower jaw to the left or clenched her teeth. We must assume that the levator is innervated not only by the oculomotor nerve, but by fibres which have their origin in the nuclei of the facial and trigeminal, as well.

JITTA.

SNYDACKER (177, *Plastic lid-operation with flap from the neck*) reports the following procedure which gave an excellent result in the case of a young man who had had Thiersch grafts applied to the lids eight years previously on account of total ectropion and marked cicatricial deformity following burns. The cicatricial strands were excised and the lids sutured together. A flap 2cm long was taken from the sterno-cleido region, its lower end split and used to form lids, the upper part serving merely as a bridge. This part is covered with gutta-percha tissue to keep it from contact with the skin of the cheek. Six days later the bridge was cut through and

the temporal end of the new lids sutured in position. The thin skin of the neck is particularly adapted for use about the eyelids.

THOMPSON (178, *Surgical treatment of ptosis*) advises the following modification of Wolff's operation for advancement of the levator. A skin incision is made which extends up to the upper margin of the tarsus and the latter is separated from the underlying tissue. The orbicularis and the tendon of the levator are exposed back to the point of disappearance within the orbit. The tendon is then resected and anchored to the tarsus by mattress sutures.

ALLING.

KUHN (179, *Operative enlargement of the lid-fissure with use of cutaneous tissue*) exposes the conjunctiva for purposes of treatment in old trachoma with cicatricial contraction by cutting through the lid angle and severing the external tarsoorbital ligament, besides reducing tension by making a vertical incision through the conjunctiva near the corneal margin. A large Thiersch graft is then placed in the blepharotomy wound. In case it is necessary to prevent all shrinkage or to improve the position of the lids, a lancet-shaped piece of skin is circumcised at the external angle and the above operation completed. The loosened skin area is then buried by sutures.

MONTIUS (180, *Beneficial effect of tarsorrhaphy in injuries of the globe*) reports 7 cases of injury of the globe in which tarsorrhaphy had an excellent effect. It is advised in all penetrating wounds of the globe (cornea, sclera, limbus) to take the place of scleral or other sutures. It is specially indicated in children and allows the bandage to be removed early and shortens the time of treatment.

BACH's (181, *Symmetrical lipomatosis of the upper lids—blepharochalazis?*) young patient had a swelling of the entire upper lid of both eyes which had gradually increased during ten years. There was marked redness and tense elastic fluctuation. The swelling increased at the menstrual period. On incision, large masses of fat extruded and were abscised. Redness and fine wrinkling of the skin due to relaxation are the signs of blepharochalazis which is unattended by fat formation. Bach thinks his case was one of lipomatosis or

symmetrical lipoma of the lid with consecutive thinning and relaxation of the skin of the lid.

HIRSCHBERG (182, Congenital lymphangioma of lids, orbit, and face) describes 2 cases of lymphangioma of the lids, conjunctiva, and orbit as well as of the face which had been under treatment from childhood to early adult life. The condition was said to be congenital and grew slowly with some swelling of the parts and occasional spontaneous hemorrhages. In one case the optic nerve had suffered. Microscopic examination of excised portions showed cavernous spaces lined with endothelium.

HOSCII (183, Ophthalmological miscellany. 6. Lipo-dermoid of the conjunctiva) examined a tumor situated just below the enlarged lachrymal gland, in the upper outer part of the conjunctiva of the globe between the insertion of the superior and that of the external rectus muscle. The patient was a woman of forty-one. The tumor was soft, not sensitive, about 1cm in diameter, covered by conjunctiva and showed a long fine hair. This tumor had become noticeable and disturbing by its growth during the preceding two weeks. At the same time a small elevation, flat and about the size of a half lentil, was seen at the sclero-corneal margin. This had been present since birth and caused no inconvenience. The location and sudden growth of the equatorial lipo-dermoid while the other remained unchanged is striking.

OHSE (184, Bi-lateral coloboma of the upper lids with dermoid of the sclero-corneal margin) reports the case of a girl of eleven who was mentally well developed but showed several congenital anomalies of a physical nature. The upper lid presented a split formation 2cm square. This space was occupied on closure of the lids by a tumor of the lower sclero-corneal margin whose surface resembled cutis and was covered with downy hairs. The right upper lid showed similar conditions although less marked. The inner third of the brows was drawn out of place. A narrow patch of hairy skin ran down 2.5cm from the forehead across the brow toward the left lid fissure. The nose was twisted and defective, and there were congenital anomalies of the frenulum, skin of the cheeks, and angle of the mouth and ear. An

operation was performed on the lid and the tumor of the left eye with good result. The theory of Van Duyse that amniotic bands are responsible for such developmental defects is accepted by Ohse for all colobomas of the lid and dermoids of the conjunctiva.

The tumor in the case reported by ROSENMEYER (185, Cirsoid neuroma and hydrophthalmus), of a girl of five, had increased in size from birth on, at first involving the upper lid only and later growing toward the temple. The globe was being pushed out of place, and Kroenlein's operation was performed; and as much as possible of the tumor, a neurofibroma, extirpated. Within about half a year hydrophthalmus developed and the whole corresponding side of the face became swollen and doughy without any inflammatory changes in the skin. The hydrophthalmus was attributed to lesion of the ciliary nerves.

JOHNSTON (187, Primary sarcoma of the eyelids) found 23 cases of melanosarcoma of the lids on record. In his case, the tumor occupied the exact middle of the lid between skin and conjunctiva. The growth was shelled out and did not recur. Rapid recurrence is the rule, and these growths may start from pigmented naevi or from scar tissue. In Johnston's case the origin was obscure.

ALLING.

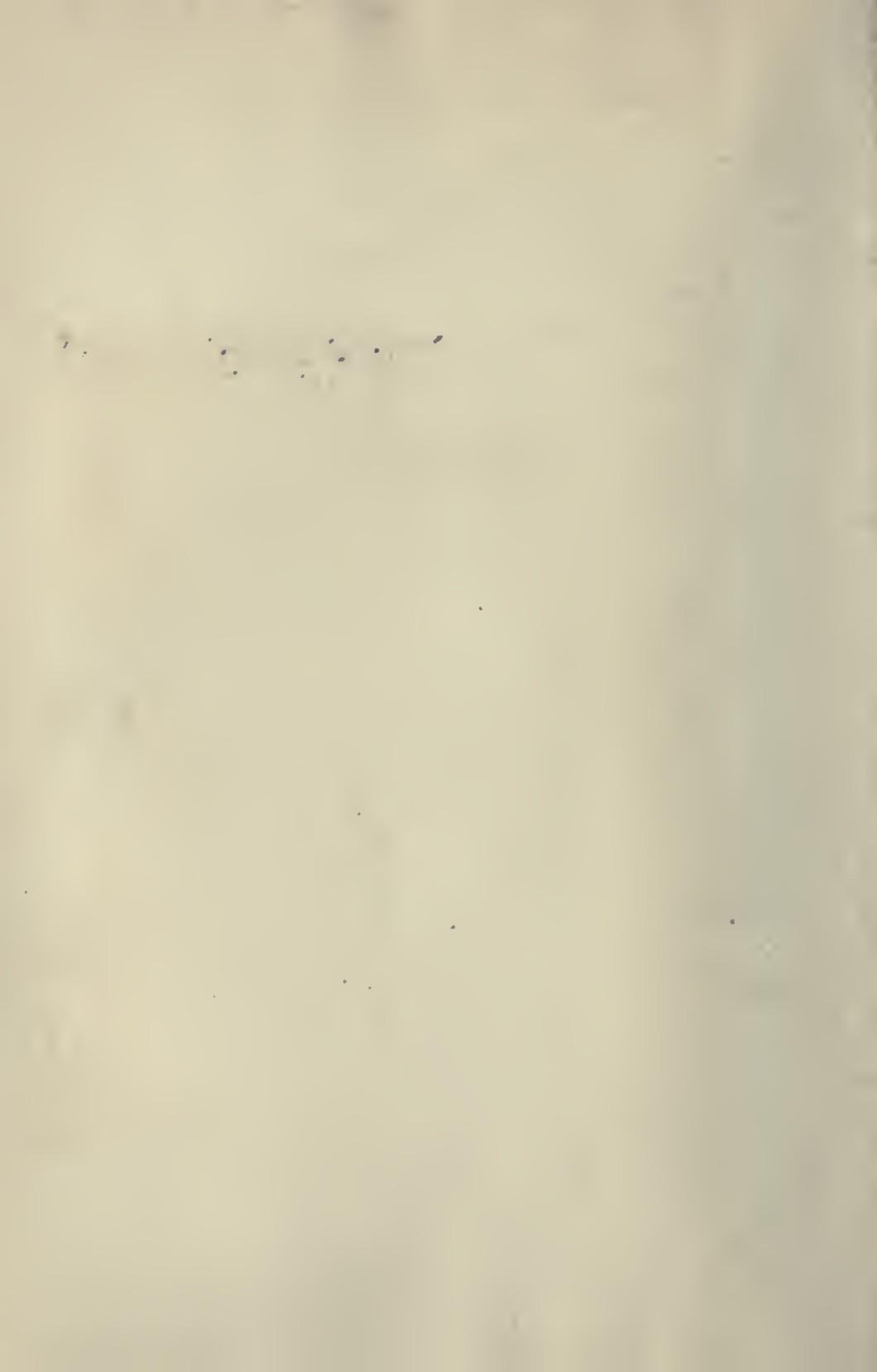
PRAWOSSUD (188, Two cases of cancer treated with radium) reports a case of epithelioma of the upper lid cured completely after 13 applications of radium bromide (0.01) with the usual precautions. Each treatment lasted from $3\frac{1}{2}$ to 5 hours, so that there were $43\frac{1}{2}$ hours in all within 3 months. In the second case, adenocarcinoma of the tear-sac, treatment with radium failed absolutely.

ROLLET (190, Treatment of palpebral epithelioma. Blepharoplasty with sliding flap) recommends excision of epithelioma of the lid with the formation of a vertical sliding flap instead of the usual horizontal one for blepharoplasty.

RISLEY (193, Cavernous angioma of the eyelid) saw an angioma in a child eleven weeks old which began near the outer canthus and involved about three-quarters of the right lower lid. It had been rapidly increasing in size from a few days after birth. Fearing deformity from the necessarily extensive

operation of excision he used electrolysis but further than causing the tumor to become harder no results were obtained. He then introduced an Ericsson suture forming numerous loops throughout the tumor. When the threads were tied the mass was completely strangulated and sloughed off in about a week. The resulting cicatrix showed no tendency to produce ectropion.

ALLING.



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